SECRET

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Sept 1958

Noted by SAIPO/DCI

EASTMAN KODAK COMPANY

APPARATUS AND OPTICAL DIVISION

400 PLYMOUTH AVE. N. ROCHESTER 4, N. Y.

October 9, 1958

USAF Declass/Release Instructions On File

Mr. Richard Bissell
Central Intelligence Agency
Washington 25, D.C.

Dear Sir:

In a verbal reply to our letter of August 15, 1958 you requested that we provide you with some detailed information on the modifications made to the various machines which comprise your two Minicard installations, as well as the additional equipments which are being supplied to you but which are not called out in our contract.

We are appending the requested information to this letter and have so arranged it that the changes are identifiable with individual Minicard machines. The lists which are submitted were prepared by our engineers and constitute what in their opinions are the conceptual, functional and manufacturing changes which were made to improve machine capability, safety, and performance. While the lists are not intended to be all-inclusive, we believe that they include the more significant changes made to the machines. The brevity of the text associated with each of the changes should in no manner be construed as indicative of the magnitude of the work involved in them, since our people have condensed the information to reduce the volume of written material.

Our letter of August 15, 1958 made mention of the fact that we had installed and were currently operating a Minicard system in the Pentagon. That system was installed in April of this year, and from that time to the present a number of machine modifications have been made. As we have previously informed you, we have continuously up-dated the machines in your two sets to incorporate such changes, and as of this date we are in the process of completing that work. As an additional enclosure to this letter we are including the listing and description of the machine changes which have taken place since April of this year, the last of which are currently being made on your machines.

We trust that the enclosed material fulfills your request.

25X1A

Very truly yours,

25X1A

[redacted]

Research and Development

[redacted]

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TELEPHONES • CAMERA WORKS, LOCUST 2-6000 • HAWK-EYE WORKS, CONGRESS 6-2020

Attachment 9

SECRET

DOCUMENT NO. X
NO CHANGE IN CLASS.
DECLASSIFIED
CLASS. CHANGED TO: TS S C 2011
NEXT REVIEW DATE: 12/12/84 AUTH: HR 70-2

ENCLOSURE I

INSTRUMENTS AND WORK ORGANIZATION AIDS
ADDED SUBSEQUENT TO CONTRACT AWARD

1. FILM LUBRICATOR

Since most of the Minicard machines are called upon to extract, handle, and read one Minicard record at a time, it is important to insure that the cards are extracted one at a time from magazines. If cards are extracted in multiples, they cannot be read by the electronic scanning equipment, and further may cause a malfunction of the card transport mechanism. To mitigate against the occurrence of these error producing phenomena, a film lubricator was developed that would permit the coating of the film with a lubricant to prevent cards from sticking together. The Lubricator is a motor driven device which is used to coat both sides of the film after processing and also provides for appropriate rewind of the film so that its orientation is proper for subsequent handling.

2. MASK PRINTER

A study of the tolerances which affected the position of the filing word code on the Minicard records showed that it would not be possible to use a camera code target to expose a mask for the file word area on the Minicard record. A special device called the Mask Printer was so designed that it would accurately expose a mask of appropriate dimensions on the Minicard film at a high rate of speed. The device is used for film raw stock which is to be exposed in the camera to prepare LN Minicard records.

3. MULTIPLE STICK

A device capable of removing cards from ten magazines simultaneously was designed and built. In essence, it consists of ten regular 2000-card sticks with a common handle which actuates all sticks at once.

4. HOLDER FOR MULTIPLE STICK

Appropriate brackets have been attached to the sorter to hold the multiple stick in between operations.

5. BLOCK STAND

A stand was made to hold a pair of 50-magazine blocks. It is so designed that the blocks can be transported on it between the file cabinets and the Sorter and Selector.

6. INCLINED BLOCK STAND

A special stand was made to hold one 50-magazine block at a 45° angle to permit examination of the bottom of the block in case of trouble.

7. TRANSIENT CARD HOLDER

This is a 10-compartment device into which sticks of cards can be inserted for temporary storage in between successive machine operations.

8. CODE READING LOUPE

This loupe is a specially designed device with a five power eye piece, a reticle, and a Minicard film record holder. When the reticle is in contact with the card the reticle pattern enables the viewer to read the code and readily identify code errors that may exist.

9. TRANSFER TRAY SPACERS

Two extra spacers were provided for each transfer tray to speed up the combining of groups of cards onto one stick.

10. MULTIPLE TRANSFER TRAY

A special transfer tray with six compartments is being made. This device will serve many work organization needs and may be used as a transport medium for several sticks of cards, as a temporary storage place for long sticks of cards, and as a transfer medium for complex regrouping or combination jobs.

ENCLOSURE II

MACHINE MODIFICATIONS

DOCUMENT CAMERA

At the inception of the contract the Minicard Camera design was completed and a model had been constructed. Although the Camera operated satisfactorily, it was decided to institute a redesign in order to improve the operational features of the machine. In the original model the electrical controls for the Camera were housed in a separate cabinet. It was thought desirable to incorporate these controls in the main Camera body. The self-perforating feature was also eliminated so that pre-perforated film could be used. In addition to these major conceptual changes the following list covers many of the detailed modifications made to the re-designed instrument.

1. Installed current-sensing relay-- to detect code target lamp burnout.
2. Cut out back covers-- to provide necessary ventilation for electrical and mechanical components.
3. Installed blower fan and associated duct work-- to keep heat from lamp resistors away from drive motor.
4. Added two relays and associated wiring in reject circuit-- to permit consecutive rejects which original control circuit would not do.
5. Replaced power supply with regulated 90v d-c supply-- to improve electrical operation.
6. Changed film clamp solenoid and associated lever mechanism-- original was not strong enough to clamp film properly-- to improve reliability of operation.
7. Made and installed new shutter blades-- to improve reliability.
8. Made and installed new pulleys-- new "V" notch improved transmission of drive torque.
9. Made and installed new shutter aperture-- to minimize possibility of fogging the film.
10. Made new film idler rollers-- to permit lateral adjustment of film.
11. Added stronger springs in film carriage-- to improve film tracking against guide edge.
12. Redesigned and strengthened latch pawl for code shaft clutch.
13. Realigned code target to accommodate 43rd bit.
14. Changed type of code target lamp-- to improve illumination of code recording system after program of testing.

DOCUMENT CAMERA (cont.)

15. Film carriage registration pin was beveled-- eliminated cocking influence on film.

16. Added cork face to reset shaft brake-- to insure smooth braking.

17. Exit slot in code target was enlarged-- to eliminate light fall-off at end of code column.

18. Added brace to arm which supports cams L1, L2, L3, L4-- to improve reliability of contact closure.

19. Replaced reset clutch springs with spring and plunger device-- eliminates spring cocking and binding in reset clutch.

20. Added heavier spring and guide clamp to code ratchet pawl-- to improve code indexing.

21. Designed and installed improved disengaging studs for code shaft clutch.

22. Code target rewired.

23. Made a new remote-control assembly with improved switches.

24. Registration pin indicator designed and installed.

25. Converted Camera to drop off first two sortation columns (circuit change).

26. New film chip container was added.

27. Code target rebuilt; redesigned many components to produce Minicard record within newly established tolerances.

28. Clutch solenoids altered to use solid steel instead of hollow cores.

29. Redesigned clamp and film punch bracket to permit unit assembly.

30. Take-up clutch rebuilt (cork faces added to improve torque uniformity).

31. Reworked Camera head to accommodate alignment tools (added necessary tapped holes and machined surfaces).

32. Ratchet shaft slip brake made adjustable.

33. Improved code advance pawl-bearing-pivot-- to obtain better reliability.

34. Film carriage return spring guide pin installed-- to prevent buckling and binding.

35. Redesigned code clutch stop pawl assembly-- to eliminate marginal performance.

DOCUMENT CAMERA (cont.)

36. Installed improved ventilation system for lamp resistors.

37. Improved optical system in target by substituting differentially coated lenses and adding condenser and lamp adjustments.

38. Installed a focusing mount for the document lens.

39. Installed adjustable mount for code lens.

40. Redesigned shutter to permit use of replaceable pivots.

41. A solenoid door lock was installed.

42. Eye shield added for operators to reduce glare from lights.

43. Improved vacuum pump mounts designed and installed.

44. Shutter mask solenoids altered to eliminate wax impregnation.

45. Lamp socket redesigned to improve contact.

46. Automatic reset test device designed.

47. Pin solenoid magnet changed to increase pull.

48. Suppressed clutch circuits to prevent excessive arcing (improved performance).

49. Added mercury relay to target reset circuit to eliminate contact arcing.

50. Vacuum solenoid magnet replaced with new design to prevent marginal operation.

51. Illumination circuit mercury relay added to protect timer contacts.

52. Stabilized code illumination by adding Sola regulator to power line.

53. Increased voltage on stepper switch to improve operation reliability.

54. Changed limit switches to improve operation.

55. 110-volt outlet added for service testing.

56. Interlocked trailer and leader controls to establish proper control operation.

57. Re-engineered code target lamp circuit to eliminate long term illumination changes caused by contact resistance and other circuit resistance changes.

DOCUMENT CAMERA (cont.)

58. Redesigned film-break switch to provide vertical instead of lateral force (improved film tracking).

59. Installed Meltron vacuum switch and indicator to indicate vacuum failure.

SIS CAMERA

Many of the changes and modifications which were required to the Document Camera were also required to the SIS Camera. They are in general not repeated here since the repetition would not be of assistance.

1. Designed a sensing circuit and mounted detection micro switches for graphic copy limiting baffles.

2. Designed circuit and installed interlocks to detect that the proper lens was in use.

3. Installed micro switch on positioning arm of reset shaft to prevent engagement of clutch until positioning arm is disengaged (circuit reliability improvement).

4. Installed differentially coated lenses in code target.

5. Installed new more accessible fuse panel.

6. Redesigned and installed hinged front control panel to improve service accessibility.

7. Installed Meltron vacuum switch in film carriage line to indicate vacuum failure.

8. Redesigned platen and eliminated vacuum hold-down. It was found that the original vacuum platen concept was difficult to use when several layers of documents were used in the copy plane.

9. Designed and installed storage box for accessory lenses.

10. Removed reject notching mechanism and altered circuit.

11. A new system of ratchet shaft positioning and associated circuit was devised and installed to eliminate the five code shaft indexes during the reset cycle.

12. Altered code shaft speed from 320 rpm to 285 rpm to prevent a critical timing condition.

13. Redesigned and rebuilt shutter to improve reliability.

14. Altered lens shaft return spring after a long term test program had indicated the necessity of the change-- to maintain format accuracy.

SIS CAMERA (cont.)

15. Altered carriage return spring to improve code recording uniformity.

16. Installed steel collar on code shaft for friction brake to eliminate chatter caused by changing load on spur gear train.

17. Installed and wired accessory output receptacles so that they could be used when the Camera circuit breaker alone was on.

18. Altered reset switch and circuit to improve reliability (normally closed contact added to EX relay circuit, reset clutch to TC_1 relay).

19. Installed mercury relay in reset circuit to eliminate arcing (C-1 cam contact).

20. Added normally closed EC-2 contact to EC (excessive column relay) circuit.

21. Relocated document exposure lamps.

22. Replaced movable film carriage leads with flexible cable to eliminate breakage.

23. Added new lamp shields required by change of lamps and lamp configuration.

24. Prepared a control circuit operation manual for Camera including limited preventive maintenance.

25. Redesigned entire control circuit and relay logic to improve accessibility.

26. Added auto transformer and eliminated series resistance in illumination circuit.

27. Improved clutches installed (pin and spring design).

AERIAL PHOTO CAMERA

In the first conversations which were held between your representative and ours it was planned that the original Minicard Document Camera would be used to fulfill the aerial photography requirements. Since it was intended that the work to be performed by this Camera would be consistent with the state of machine development at that time, no further extension of design work was thought to be required. Discussions subsequent to the start of work indicated that a much more elaborate machine was wanted, and that it would of necessity be required to possess higher quality images and a magnification different from that supplied by the Document Camera. The net result of that decision was to require that an entirely new approach be taken to the design of a camera which could record, with a minimal loss

of resolution, aerial photographs of extremely high quality. All prior design work was set aside and a completely new engineering approach undertaken. An attempt was made to capitalize on the engineering changes initiated for the new Document Camera so as to avoid duplication of effort, and many of the changes which were made on the Document Camera mechanism design were also reflected in the design of the mechanism of the Aerial Photo Camera.

In addition to these modifications, there is listed below the major additional work that was performed in the execution of this design.

As may well be appreciated, an enormous amount of photographic investigative work was undertaken in collaboration with the customer's technical personnel in order to arrive at a suitable method for transferring original aerial photography to Minicard film without loss of photographic latitude. The same kind of effort was expended for the other cameras and resulted in many machine modifications, some of which are covered in the lists.

1. Code target pins replaced - aperture mask reworked to comply with Minicard tolerances.

2. Added baffle and exhaust system to drive motor to eliminate oil vapors.

3. Added a blower cut-out to condenser illumination lamp to shut off blower in event of lamp failure (to prevent breakage of optics from rapid cooling).

4. Added perforated paper tape reader to speed camera code recording and permit use of fixed field tape loop.

5. Altered camera circuitry so that camera will verify the first line of code from the tape reader as well as the Flexowriter.

6. Variable exposure lamp control and meter installed. Meter replaced later with more sensitive exposure indicating device to improve quality.

7. Torque motors installed to improve code positioning accuracy.

8. Cam control for torque motor capacitance added to footage dial.

9. Added code target lamp adjustment. This required alterations to camera structure to provide lamp adjustment capabilities.

10. Changed code column format to eliminate CS - CF sortation column.

11. Reworked film idlers to improve film handling.

12. Rebuilt sensing arms on lens shaft for reliability (mechanical ruggedizing of arms to improve stability).

13. Mercury lamp for negative illumination changed to tungsten filament lamp with filter.

14. Added power supply to operate film punch solenoids.

15. Remotely mounted the vacuum pump to eliminate vibrations.

16. Designed and built a new recording lens since existing commercial lenses were unsatisfactory.

17. Designed a photographic objective for P-2 Camera which was later suspended.

18. Conducted a program of photographic investigation to determine proper exposure judging system for recording of photo aerial negatives on Minicard film records.

19. Program controls for code recording changed as a result of format change requirements.

20. Relocated code target for 8.000X to 8.299X reduction to accommodate 43rd bit format change.

21. Developed and installed a special mechanism to shift lens from aerial photo to code recording state while holding positional tolerance to less than .0002" total variation.

FILM PROCESSOR

As may be appreciated, an entirely new film and film processing technique was required in order to insure the successful performance of the Minicard system through its many generations. Many changes were made to the film and the emulsion and were immediately followed by concomitant changes in the chemistry of the process. Invariably, these changes to the chemistry required changes to the machine. Some of the more significant machine changes which were instigated after the machines were built and the subsequent chemistry of the process was established are summarized in succeeding paragraphs.

1. Several methods were tried to control the developer temperature.

   a. A heater and thermoswitch were first used. The adjustment was too course for this purpose, but is now used for holding the processor in a stand-by condition.

   b. A recirculating system was added consisting of a circulating pump, a jet-pipe in the developer, a thermistor probe controlled by a Fenwal electronic unit, and a heat exchanger controlled by a Sarco valve.

   c. The Sarco valve control was too course and was later replaced by a solenoid valve. At the same time the temperature of the incoming water to the heat exchanger was controlled.

FILM PROCESSOR (cont.)

2. Two air Squeegees were added; one after the developer tank to mitigate against uneven development, and the other after the squeegee rollers to eliminate drying spots.

3. The direction of the take-up spool was changed to wind the film with the emulsion out in order to produce flatter cards. Provisions were made for a simple change to permit spooling with emulsion out or in.

4. A study of the effect of drying temperature on film curl resulted in reducing the drying temperature to 135°F.

5. Several modifications were made to prevent dust and lint from accumulating on the film during processing.

   a. A cover was added over the take-up reels.

   b. The blower housings were cadmium plated.

   c. Holes, which were put in the back doors to increase ventilation, were covered with filters.

6. A clip was added to hold the squeegee rollers together even after a film splice has passed through.

7. The controls were rewired to make it impossible to process film with the switch in the stand-by position.

8. The terminal strip in the rear of the machine was repositioned to prevent short-circuiting when it was splashed by solutions dripping from the replenisher lines.

CUTTER

1. A hinged plexiglass cover was added to keep the film area clean during cutting and idle times.

2. Eccentric stop posts were installed to keep sprocket clamps from making contact with sprockets when the cutter is run without film.

3. Clearance in the film guides was cut down to help keep concave or convex film in a flat condition, enabling it to pass under the cutting die without marking.

4. Because of the above change, the nylon pressure pad was removed to eliminate a source of marking and adding static to cards.

5. The bottoms of the cutting head assembly castings were scraped to allow a more accurate reassembly after service work.

CUTTER (cont.)

6. Edge notch sensing micro switches were changed to a short-throw type to help overcome close tolerances in camera and inspection viewer edge notching.

7. A new Venturi-type adapter was added for a much smoother air flow, increasing the suction at the cutting areas.

8. Drive belts used on the reject roller assembly were changed from plastic to spring type, to minimize breakage.

9. The cutting die (1.260) dimension was increased to positive side of perforation pitch tolerance to eliminate possibility of cutting cards at both ends during cut-off operation.

10. A scrap elimination assembly was added to dispose of reject cards and film.

11. The lead-in taper on the cutter stick was changed to prevent jamming; this required new sticks.

12. Weights on sticks were changed to help prevent jamming.

13. A safety switch was added on the magazine assembly to shut off the machine after a 2000-card stick was full.

14. The intermittent sprocket was replaced with a sprocket with a new type tooth to eliminate slippage. The new sprocket was made of steel instead of aluminum to decrease wear.

15. A jumper cable was made to allow running of the cutter for service work with the outer case removed.

INSPECTION VIEWER

1. An adjustable friction brake was added to the rewind spindles to prevent coasting.

2. A 2-power magnifying glass was added to aid in examination of the film.

3. After some experience with the original design, it became apparent that the tilted film track was more elaborate than was required. Therefore, the entire viewer was redesigned and simplified.

   a. The light box was made with a flat top.

   b. The film is supported by rollers at each end; the track is eliminated.

   c. The rewind assemblies were greatly simplified.

INSPECTION VIEWER (cont.)

d. The punch was redesigned.

e. Opal glass was added for diffusing the light.

4. After some experience was gained with the new viewer, it was found desirable to cut a .015 recess in the punch block to reduce the possibility of scratching film as it was passed by the station.

DOCUMENT ANALYSIS VIEWER

1. A request was made that the original model of the viewer (with a transmission screen) be reworked as follows:

   a. Change magnification from 50X to 60X.

   b. Change screen size from 8½" x 11" to 8½" x 14".

2. It was requested that a second model be made, this one having a reflection screen. (All other components were duplicates of those in the first model.)

3. Image rotation was requested. Several methods were tried. The dove prism method was selected.

4. Reversibility of feed was required (i.e. movement of a Minicard record from any magazine to any other magazine). This complicated the transport and vacuum system.

5. The housing at the side of the screen was made movable to permit access to the screen.

6. It was requested that the angle of the reflection screen, in the model, be changed from 55° to 15° with the horizontal.

7. It was further requested that the angle of the reflection screen in the model be changed from 15° to 25° with the horizontal.

8. Scan control was added. Rotation of an 8½" x 14" image 90° resulted in the 14" dimension being across a 8½" wide screen, thus cutting off each end.

9. A phasing switch in the image control assembly was installed to prevent the possibility of inadvertently switching the vacuum off the platen as a result of using the scan control.

10. It was necessary to add a stop pin to the image control assembly to prevent counter-clockwise rotation of the image control knob beyond the number one position when scanning.

11. The viewer was redesigned to be integral with its own desk.

12. The screen tilt was made variable between 25° and 40° with the horizontal.

13. The vacuum control system was modified to provide electrical interlocks and fool proofing. The original design used manual control of the vacuum.

14. A method for image selection or identification (punching) was added after the design had been completed.

15. The lips were changed from the sides to the ends of the magazines so that the transport plate could be used as the die during punching.

16. Because of the above change it was necessary to eliminate five rows of vacuum holes--two rows across one end of the transport plate and three rows across the other--to prevent vacuum loss when removing a card from a magazine.

17. The space between the magazine lips was increased to assist in preventing vacuum loss when removing a card from a magazine.

18. Two adjustable points or tips were added to the lower end of each magazine to riffle or separate cards at time of withdrawal.

19. Vibrations caused by the vacuum pump and blower produced a deleterious effect on image quality and so the shock mount design was completely changed.

20. Several changes were made to the lens to improve image quality. The change which provided the greatest improvement was that of limiting the aperture to f/3.5.

21. A power relay was installed to shunt the main switch. This, in effect, made the main switch inoperative while a card was being held by v acuum.

22. A terminal block was added to the inside of the front panel. This allowed the front panel to be removed, thereby providing greater accessibility to the viewer interior.

23. It was desirable to reduce the noise level at the viewing position caused by the vacuum pump exhausting inside the viewer. An elbow and length of pipe were added to the pump to carry the exhaust down to the floor through an opening in the bottom of the viewer.

24. Trays were added beneath the magazines and viewing station of the instrument to prevent card loss due to power failure.

25. It was necessary to add a second mark-button wired in series with the first one to prevent an operator from holding the transport knob while punching.

DOCUMENT ANALYSIS VIEWER (cont.)

26. The original punches produced holes with barely perceptible ragged edges and as they became more worn the edges of the holes became slightly more ragged. The ragged edges of the holes were sometimes interpreted by the Enlarger to be document control marks. The punches were reworked to fit better and produce sharper edges. Alignment of the punches and dies was not satisfactory with the existing design and the punch life became very short. Since regrinding and replacement were difficult, the whole assembly was completely redesigned.

DOCUMENT ENLARGER

1. The original enlarger design was a rotary mechanism with a turnover feature so Minicard records would be removed from the enlarger in the same sequence as loaded into it. The enlarger was redesigned when the requirements were changed.

2. Several methods of holding Minicard records flat and several illuminating systems were breadboarded to obtain the best resolution and maximum scratch suppression.

3. Considerable work was necessary to insure consistent card handling when the final film base and processing treatment were established.

   a. Plungers were enlarged.

   b. The plunger cam was redesigned.

   c. The vacuum system was enlarged.

   d. A vacuum was applied to the carriage to counteract static.

   e. The magazine retainers were redesigned.

4. The paper magazine, paper feed timer, and paper processor built by Photostat required re-engineering and rework to make them function properly.

   a. An end-of-paper detector was added.

   b. The paper supply capacity was increased from 350 feet to 1000 feet.

   c. The original electronic timer would not operate consistently and so a new one was designed.

   d. The processor was rewired for easier servicing.

   e. Paper wind motor circuit was changed to eliminate arcing and burning of relay contacts.

DOCUMENT ENLARGER (cont.)

f. A relay was added to the paper magazine to eliminate a sneak circuit which occasionally caused improper timing of prints.

g. The drain system for emptying the processor tanks was reworked to eliminate solution spillage.

h. Operation of the processor indicated that a print stacker was necessary. This was designed and installed on the dryer.

5. Redesigned entire electronics to meet more exacting requirements.

a. Redesigned all mono-stable multivibrators.

b. Redesigned reading amplifiers for image channels 1 and 2.

c. Redesigned timing mark channel.

d. Redesigned thyratron circuits.

e. Redesigned image location channel.

f. Redesigned timing mark absence detector circuits.

6. Redesigned entire shift register and substituted new magnetic cores. The original cores were unsatisfactory due to frequency limitations and temperature instability.

a. Replaced the original 2-core per bit design with a single core per bit assembly.

b. Redesigned input system-to-core memory circuits to improve compatibility and reduce noise to a minimum.

c. Redesigned relay thyratron circuits to improve sensitivity.

d. Added noise suppression to numerous packages to eliminate false shifts.

e. Added line filters to paper processor.

7. Provided a reading station optical system in which cell signals could be phased.

8. Redesigned cell system so the signals would not saturate the cells. Also provided shunts on all the cells.

9. Installed a regulated supply for the scan lamp voltage.

10. Scan lamp voltage made adjustable so optimum signal could be obtained.

DOCUMENT ENLARGER (cont.)

11. Dynamic range of the system was reduced from 6:1 to 3.5:1 to reduce possibility of erroneous decoding since,

    a. The maximum D_{min} was being reduced from 0.2 to 0.15, and

    b. Holes punched by the Analysis Viewer were slightly ragged.

12. Modified image clutch circuitry.

13. Mercury relay added for faster operation of glass platen circuits.

14. Additional noise suppression provided, and included relay suppression and decoupling on amplifier packages.

15. Added gate system so reading station reads in one direction only.

16. Redesigned cell polarization voltage system.

17. Removed d.c. fans and replaced with a.c. type to reduce noise.

18. Provided additional cooling to electronic packages.

19. Enlarged platen holes to improve signals in image location channel.

20. Rewired complete Enlarger to facilitate servicing.

21. Reduced Enlarger dynamic range of 3.5:1 to 2.5:1 and installed potentiometers for periodic adjustment. This was necessary to reduce the possibility of obtaining false signals from the edges of holes punched by the Analysis Viewer and also to take advantage of the reduction in D_{min} from 0.15 to 0.10.

AERIAL PHOTO ENLARGER

1. The glass platen and the Minicard carriage were redesigned to achieve the required focusing accuracy.

2. Rework was necessary to insure consistent card handling when the final film base and processing treatment were established.

    a. Plungers were enlarged.

    b. Plunger cam was redesigned.

    c. Vacuum system was enlarged.

    d. Vacuum was applied to the carriage to counteract forces due to electrostatic charge generation.

    e. Magazine retainers redesigned.

AERIAL PHOTO ENLARGER (cont.)

3. The paper magazine, paper feed timer and paper processor required trouble-shooting and rework to make them function properly.

   a. An end of paper indicator was added.

   b. The timer required circuit revisions to eliminate sneak circuits, and complete rewiring.

   c. The drain system for emptying the processor tanks was reworked to eliminate solution spillage.

   d. A new print stacker, different from that on the Document Enlarger, was required due to the heavier paper used in the Aerial Enlarger.

   e. The paper magazine was rewired to eliminate arcing and burning of the paper wind-motor relay contacts and for easier servicing.

DUPLICATOR

The mechanical portion of the Minicard Duplicator was substantially completed prior to the start of the contract. The machine had to be completely revised as a result of the decision to provide for the handling of multiple card documents. The original plans were limited to the provision for multiple card document handling by means of a perforated tape input that would supply the sortation information recorded on the Duplicators. Although a tape operated Duplicator was planned and would have performed all of the desired functions satisfactorily, it was felt because of the possibility of errors being introduced through manual operations that the machine should be made more wholly automatic. The final design was made automatic and uses electronic storage for the file expansion operation. From a machine that was originally intended to provide only contact prints and tape controlled cross-filing the File Expansion Duplicator suddenly blossomed into a sophisticated data processor for the Minicard system.

Some of the machine modifications which reflect the evolution of the machine into its current state are given in succeeding paragraphs.

1. Decision made to input data from first card only of any document (Modes B) rather than from two cards.

2. Modifications required due to decision to set total file words on cards to thirty-two.

3. Need to convert CS and CF to "all clear" and "all black" on tape read-in, and conversely on card read-out.

4. Incorporated "M" check in all possible modes.

DUPLICATOR (cont.)

5. Changed scanner operating voltages.

6. Decided on final 10 modes: A1 - D3 inclusive which machine now contains.

7. Changed 3C phase inverters.

8. Added cathode followers to work from 3C phase inverters into programmer electronics.

9. Added cam switch noise filter units.

10. Changed out-of-film switch circuit.

11. Changed duplicator scanner optics for redesigned, improved, on-axis system.

12. Made wiring changes in base cabinet for engineering compatibility reasons.

13. Modified core clear circuits, reworked core clear packages.

14. Modified power control circuits to improve voltage sequence operation.

15. Incorporated cam switch noise reduction networks.

16. Wiring changes made which result in elimination of certain cables.

17. Logic revisions made. Wiring changes as result of checkout.

18. Revised logic to locate S-tag by tag-recognition rather than by timing mark count.

19. Provisions made for optional timing mark exposure control.

20. Revised scanner circuits to operate with magnetic pickups instead of photo-transistors.

21. Modified Flexowriter circuits.

22. Enlarged card-disc apertures to prevent false timing marks.

23. Some redesign of one-shot clutch solenoids required for improved reliability.

24. Major code reader revisions made.

25. Optical redesigns of code target mirror mount made to expand range of adjustment.

26. Made changes in nest gasket height to improve contact printing.

DUPLICATOR (cont.)

27. Installed new coated scanner optics, tested and selected new scanner lamp; tested, selected, and installed new scanner lamp blower. Modified associated electrical circuitry.

28. Tested light-tight hood for temperature; installed blower ventilators as a result.

29. Changed edge notching to photo-edge marking of raw stock.

30. Changed longitudinal registration to incorporate film registration solenoids for adequate accuracy.

31. Made extensive card handling modifications involving magazines and vacuums.

32. Changed main base cabinet circuit breaker due to increased loads.

33. Added third vacuum pump.

34. Realigned optics for 43rd bit accommodation.

35. Changed cam design at both input and output magazines to improve card handling.

36. Changed to vacuum solenoid valves (2) to eliminate cam valves in pressure pad.

37. Redesigned card nest and pressure pad pins for more accurate longitudinal registration.

38. Modified film transport by adding extra film index sprocket and added guide rollers for more accurate longitudinal registration.

39. Installed new cams and limit switches of improved design (reliability improvement).

40. Modified code target and lamp control chassis to accommodate reworked base mount (optical design change to increase uniformity of exposure).

41. Made numerous changes in lamp control chassis as required for above changes.

42. Added new connector on rear of base cabinet for additional circuits.

43. Added blower to cool card at read station.

44. Made necessary changes for single file column format: code target, optics, etc; notched printing apertures; reworked code target aperture plate for TM generation; reworked read station clamp.

DUPLICATOR (cont.)

45. Changed operating rate (basic) of duplicator mechanical unit to one per second to improve resolution. Made necessary cam-switch timing changes, exposure changes, etc.

46. Improved accuracy of read station clamp by pin adjustments.

47. Incorporated a change to permit manual indexing of film while machine is being loaded.

48. Installed film threading error switches and designed and installed circuitry to operate with switches. Also installed door interlock switch on hood.

49. Made extensive logic and circuit changes to programmer unit.

50. Replaced inner and outer nest gaskets with new materials to improve resolution.

51. Performed extensive system card and film handling tests, and made many machine changes as a result.

52. Installed 500 VA Sola as well as larger Sola on code reader and phase inverter filaments to stabilize filaments, print lamp voltages, etc.

53. Added circuit in code reader to detect failure of polarizing voltage supply.

54. Added meter and test jacks and circuit to lamp control chassis for recording and setting of three lamp voltages.

55. Installed additional blower to cool cell array.

56. Installed dial gage to monitor cell array lateral position.

57. Made miscellaneous machine changes to increase accuracy as required by tolerance calculations.

58. Installed "dimples" on card magazines to improve card handling.

59. Reworked Geneva drive mechanism to improve indexing and positioning accuracy.

60. Made additional heat runs on base cabinet equipment which resulted in the design, construction, and installation of a code reader manifold, along with improved louvres on side panel.

61. Made change to timer circuit in console to eliminate a marginal condition.

62. Improved code target control wiring.

63. Reworked mechanical parts of code target for increased reliability of operation.

64. Changed duplicator scanner lamp to one of improved performance and modified scanner to accommodate this change.

65. Modified cell array circuits: Removed shunts, installed cell polarizing voltage potentiometers, changed bit amplifier 608 to 6678's, and changed bit amplifier circuits.

66. Modified phase inverters. Changed amplifier time constants.

67. Installed R.F. filters in main power supply busses.

68. Designed new trailer-leader circuit using new timer.

69. Improved read station clamp backstop to minimize movement.

SORTER

In succeeding paragraphs we are listing a small number of the modifications made to the Sorter. Since the majority of modifications made to the instrument came about after April 1958, they are not listed in this resume but are rather contained in the final enclosure to this document which recounts all machine changes made since April 1958.

1. Replaced timing shaft clutch parts to eliminate possibility of jamming.

2. Modified plunger block to improve efficiency of low vacuum system.

3. Revised single shot multivibrator packages to improve coupling.

4. Added regulated transformer for code reader lamp.

5. Added regulated transformer for filaments of tubes.

6. Added blower in programmer to improve cooling.

7. Replaced all printed circuit connectors with a newer bellows type connector.

SELECTOR

It may be appreciated that the requirements of the Minicard Selector depended rather closely on the specific indexing system used. While the Selector could easily be adapted to any indexing system, the details of its electrical circuits could not be settled until an upper limit was set on the complexity of the indexing system.

SELECTOR (cont.)

Although the original Selector used a cross-bar switch memory and static circuitry, we were unable to capitalize on the engineering work performed on the first instrument since it was desired to go to an electronic memory unit and dynamic control circuitry for this Selector.

The logical structure of the indexing system was increased to a higher level and the refinements in the circuitry introduced to reflect the change. The capability of removing identical cards was added and the number of selection magazines was increased to ten in order to permit fine sorting with this machine.

In addition to these features, a sequence check mode was added, provision was made for a tape test in all modes of operation, and the basis for sorting was changed to column counting.

In addition to these fundamental features, the following constitute a summary of other machine modifications and changes introduced.

1. Added mask to hold-down clamp.
2. Added Sola regulating transformer to scanner lamp.
3. Added Sola regulating transformer for filament supply.
4. Added "cheater" switch for scanner lamp.
5. Added ∱200 volt supply for code reader.
6. Added ∱200 volt supply interlock circuits.
7. Added styling cover cooling fan.
8. Changed electromechanical counter type and circuit.
9. Redesigned and built electromechanical counter chassis.
10. Added noise clipping on select line input at console.
11. Altered amplifier design for special amplifier bail.
12. Added relay for operating vacuum port solenoid.
13. Micrometer adjustment for cell mount installed.
14. Changed plunger solenoid arc suppression network.
15. Changed to new vacuum port solenoid.
16. Added line filters for noise suppression.

SELECTOR (cont.)

17. Added overspeed relay for motor control circuit.

18. Changed plunger solenoid circuit to reduce power dissipation.

19. Changed high vacuum motor to new type.

20. Redesigned service circuit to add interlocks.

21. Total circuit changed to inhibit double counting of transitory cards.

22. Added timing shaft dial.

23. Redesigned power distribution chassis.

24. Added suppression networks to all mercury wetted relays.

25. Altered input coupling to single shot multivibrator bail to adjust sensitivity.

26. Redesigned scanner lamp control chassis.

27. Added provision for handling multiple card documents containing as many as 99 cards.

28. Added extraction mode to Selector so as to separate cards according to number of file words appearing on card.

29. Added provision for checking all cards of a multiple card document (M check).

30. Added display storage, indicating presence of alphabetic data during sorting.

31. Added duplication preparation mode.

32. Added facilities for empty hopper indication.

33. Added provisions for keeping multiple card documents intact in spite of a stop command.

34. Added sorting check feature.

35. Revised circuits to house all three stepping switches simultaneously to facilitate operator control of machine.

36. Revised duplication preparation mode; eliminated diode switch.

37. Revised sort character switching.

SELECTOR (cont.)

38. "Clear storage" relay was replaced with a mercury plunger type relay.

39. Removed local switching panel from programmer.

40. Revised card feed signals to take care of initial card feed and also to prevent simultaneous withdrawal of cards from transitory and feed magazines.

41. Added divider to console to supply ∕3 volt bias required by function switch.

42. Added circuits necessary to keep multiple card documents intact when returning cards to feed magazine.

43. Added circuits so that end-of-card signal also generates an end-of-phrase signal.

44. Added circuits to make Z-tag an end-of-phrase signal. Eliminated blanking of first two columns on card during selection.

45. Added power supply to programmer to supply additional voltage required by code reader.

46. Added radio noise filter.

47. Added cooling to cells.

48. Revised cooling of bit amplifier and synch chassis.

49. Added new power distribution box to console.

50. Modified console single shot multivibrator package.

51. Added damping circuits to relays and switches.

52. Added low vacuum interlock.

53. Added scanner lamp interlock.

54. Added polarization voltage interlock.

55. Modified motor speed control circuits.

56. Installed Sodeco counters.

57. Made changes to code reader, relay circuitry and interconnecting electronics to accommodate programmer pulse polarity change.

58. V-counter was redesigned and moved from the console to the programmer.

SELECTOR (cont.)

59. Document number comparison feature was designed.

60. Added noise limiting circuits to Start Read, End Read, and Timing Mark outputs.

61. Changed logic operating the selection error lamp.

62. Changed the interconnecting circuitry to attain the appropriate sensitivity and signal levels.

63. Eliminated noise in code reader.

64. Eliminated noise from control panel switching circuitry.

65. Added indicator lights for extraction.

MODIFICATIONS COMMON TO SELECTORS AND SORTERS (not included in other lists)

Magazines

1. The lips on the original aluminum magazines were redesigned for increased rigidity.

2. The separate lips were replaced by a lip ladder.

3. Brackets were added to support the aluminum magazine assembly.

4. The magazines were redesigned to steel construction to provide a more precise assembly and to reduce electrostatic forces.

5. A counterbalance spring assembly was added to counteract the increased weight of the steel magazines.

6. The handle assembly was redesigned for more reliable operation.

Plunger Assembly

1. Rivets were added to the plunger latch assembly to replace the soft soldered joint to improve reliability.

2. The plunger bodies were redesigned to accept a stronger spring.

3. The shape of the rubber plunger pad was changed.

4. The porting hole in the plunger body was changed.

Drive Sprocket

1. The sprocket teeth were redesigned to improve the cementing operation.

Drive Sprocket (cont.)

2. The sprocket was redesigned to make the teeth integral with the rim.

3. The sprocket teeth were redesigned so that the belt was registered on the outer surface of opposite teeth to improve accuracy.

Transport Belt

1. The tab height was reduced from .070 inch to .040 inch in order to minimize tab bending under adverse operating conditions.

Reading Station

1. A cam was placed on the rocker shaft to move the read station clamp; and replaced the cranked-motion clamp.

2. A spring loaded registration pin was added to the reading station clamp to force the card against the two fixed registration pins.

3. The nylon belt support plate was altered to increase low vacuum at the reading station.

4. Low vacuum vents-to-atmosphere were plugged at stations adjacent to the reading station to increase low vacuum at the reading station.

General

1. The transitory solenoid bracket was redesigned to permit the installation of a larger solenoid.

2. The reversing bushing assembly on the Geneva was redesigned to prevent faulty reversing.

3. The pivot bolt on the locking block assembly was redesigned for more accurate adjustment.

4. A ventilating fan was added to the top cover.

5. A larger blower motor was added to the code reader chassis.

6. Rocker arms were changed to eliminate fatigue breakage.

7. The Geneva drive was disassembled to permit impregnation of the housing castings to eliminate oil seepage.

8. The idler pulley shaft was redesigned to provide better mounting.

9. A stronger tension spring and bolt was added to the idler pulley assembly.

General (cont.)

10. The full hopper detector assembly was changed to permit a more reliable mount for the light bulb.

11. A nylon collar was added to the low vacuum assembly connector to minimize leakage.

12. Baffles were eliminated from the low vacuum manifolds to provide a low impedance path for air.

13. The belt guides were redesigned to improve the belt guidance.

14. The nylon belt support was relieved to eliminate the possibility of the belt catching and tearing.

15. The cooling manifold for the code reader chassis was redesigned for a greater air flow.

16. A bracket was designed to mount the voltage control for the scann er lamp.

17. A steel plate was added to the low vacuum manifold and a dial indicator was mounted for aligning use.

18. The pulse generator assembly was redesigned to permit more accurate adjustment.

19. The timing and rocker shaft bearing block was redesigned into a two-piece block to permit removal of the timing shaft without disturbing the rocker shaft.

20. A ground-to-size washer was added to the Geneva assembly for positioning the sprocket (front-to-back).

MISCELLANEOUS ITEMS APPLICABLE TO SELECTOR, SORTER, AND DUPLICATOR (not include in other lists)

1. When the scanning system was first completely assembled, it was found th there was insufficient electrical signal from the Ektron detectors due to the fact that the cells were more infrared sensitive than had been anticipated. A study was made of the spectral characteristics of all of the elements in the optical system. As a result, new coatings were developed for the reflective and transmission optical elements and some mechanical and optical revisions in the scanner mechanisms were made.

2. During development work on the scanning and code reading system, it was realized that no provision was made f or redundancy checking to insure high code reading reliability. While it was not feasible to ad the necessary circuitry to the equipment being built at the time, it

MISCELLANEOUS ITEMS APPLICABLE TO SELECTOR, SORTER, AND DUPLICATOR (cont.)

was felt prudent to change the card code format to include room for a 43rd or parity check bit. This would allow later equipment to accomplish an automatic redundancy check on the transfer of digital information from the card to the logical circuitry. This format change required a magnification and centering shift of all code target and scanner optical systems.

3. The original Minicard code format called for exposing the masks for the two sortation columns in the camera at the same time that the balance of the code was recorded. The sortation data was to be subsequently exposed in the duplicator in exact registry with the camera exposed masks. In practice this placed intolerably tight tolerances on the camera and duplicator mechanisms. The Minicard code format was therefore altered to permit substantially the same functions to be performed but with practical tolerances. This change required the sacrifice of a small amount of card coding capacity and introduced the separate mask-printing operation on LN raw stock previously described.

4. During the evaluation of the code reading system it became apparent that the reading system was required to accommodate a rather large number of combinations of mechanical, optical, photographic and electronic variables. Consequently, an intensive study was initiated of all the factors which could affect the accuracy of code reading. As a result of this study a number of changes were made.

   a. The code reader circuitry was completely redesigned to work on a "signal differential" or "bit edge recognition" basis rather than an absolute amplitude basis. This was necessary in order to accommodate signals of varying amplitudes that would be produced by residual variations in such features as card density, reading station illumination, ambient temperature changes, etc.

   b. The Ektron detector cell array was modified to reduce the width of the active area, and a padding procedure was instituted in manufacture to limit cell sensitivity variations.

   c. In order to permit more accurate set-up, the scanner mechanism was modified to permit adjustment and alignment as a unit and a micrometer cell translation adjustment was added.

   d. Mechanical and optical tolerances were determined for the Minicard record itself and for cameras, duplicators and card scanning stations.

5. In order to permit reasonable tolerances in the code reader electronic circuitry, it was found necessary to guarantee certain minimum dimensions for the margins surrounding the sortation columns on the Minicard records. This required more longitudinal space for the sortation columns, but it was not desirable to reduce the card code capacity. It was therefore decided to eliminate the second sortation column and use the space

MISCELLANEOUS ITEMS APPLICABLE TO SELECTOR, SORTER, AND DUPLICATOR (cont.)

thereby gained for the first column margins. The card format was accordingly changed.

6. In order to minimize the accidental triggering of bit amplifiers due to dust and other blemishes on the cards, certain timing mark blanking circuitry was added to the code reader.

ENCLOSURE III

SUMMARY OF MINICARD MACHINE MODIFICATIONS
SINCE APRIL 1958

The following listing enumerates most of the machine modifications and changes which were made in relation to the Minicard System from April 1958 to the present date. The information has, in general, been broken down by machines and components, and a short explanation has been included with each item.

ILLEGIB

CODE READER (applies to all three code reading machines: Selector, Sorter, and Duplicator)

1. A 42-channel ballast potentiometer box was added to the machine to permit adjusting each channel to a uniform triggering level.

2. The bit amplifiers were reworked to increase their sensitivity and stability. A new vacuum tube type was introduced.

3. Changes were made in the timing circuits of the synchronization chassis to permit more reliable operation with greater stability.

SELECTOR

1. Changed porting of low vacuum and removed baffles from low vacuum manifold to improve card retention on belt in vicinity of reading station.

2. Changed lamphouse design to improve uniformity of illumination.

3. Altered programmer new-card feed circuits to prevent the machine from stopping intermittently during a sorting run.

SORTER

1. Installed new rocket shaft assembly consisting of shaft, rocker arm assembly, and bearing blocks assembly.

   - This change to a larger shaft was made to minimize torsional deflection. The additional parts were necessary to accommodate the new shaft.

2. Reworked mainplate to accept new rocker shaft assembly.

3. Straightened mainplate.

   - Alignment procedure is predicated on having a flat mainplate.

4. Installed redesigned card positioning cam.

   - To accommodate larger rocker shaft.

5. Changed magazine lift gibs to Selector style.

   - To provide better lubrication.

SORTER (cont.)

6. Straightened magazine lift plate.

   - Alignment procedure is premised upon having a flat lift plate.

7. Reworked cover to accommodate new counters.

   - New counter assembly is mounted in cover.

8. Made plate assembly to mount counters and electronic components.

9. Changed handle to selector design.

   - Selector design is a stronger handle.

10. Made Selector-style sprocket (belt drive).

    - Selector design results in more accurate sprocket.

11. Installed new steel magazines.

    - Machine handling is more reliable with magazines previously checked and known to be within tolerance.

12. Reworked center plate on belt carriage to provide clearance for gaging and sighting.

    - Makes bottom of 10-magazine blocks accessible during set-up an d adjustment.

13. Reworked top pad of carriage.

    - Rubber pad was reworked to permit removal for inspection and adjustment.

14. Applied chrome plate to unplated upper carriage rails.

    - Improve corrosion resistance.

15. Installed new carriage advance driver pins.

    - To minimize backlash in carriage and increase accuracy of block positioning.

16. Modified scanner lamphouse to incorporate recent changes.

    - To improve illumination uniformity.

17. Added micrometer for cell translation adjustment.

    - Permits accurate measurement of translation for test and check-out purposes.

SORTER (cont.)

18. Eliminated mounting brackets (carriage to mainplate).

    - Mounting brackets were introducing distortion under some conditions of adjustment.

19. Cemented rubber bumpers to plunger bushings.

    - Reduces wear on rubber bumpers.

20. Added bracket for electrical connector (plunger solenoids).

    - To facilitate dis-assembly and maintenance.

21. Added new gearing to scanner.

    - To reduce scan jitter.

22. Added base plate to scanner.

    - Simplifies optical alignment.

23. New springs in plunger latch (Selector design).

    - Heavier springs result in higher reliability of de-latching.

24. Eliminated belt edge guide roller at reading station.

    - Did not appear to be necessary and could have caused belt pocket wander.

25. Machined .010 inch from nylon belt guide rail (block side of machine).

    - To provide clearance for 50-block magazine.

26. Modified pulse generator disc.

    - To provide clearance for new rocker shaft.

27. Locked blocks on carriage.

    - Resulted in more rigid locking of carriage position.

28. Clamp for steel 10-magazine block.

    - Safeguards against tipping 10-magazine block during operation.

29. Altered nylon support plate at reading station. Altered gasket to conform.

    - Provided more low vacuum at reading station.

SORTER (cont.)

30. Eliminated baffles from low vacuum manifold.

- Improved low vacuum.

31. New spring and bolt (selector design) in idler pulley assembly.

- Allowed more tension to be applied to transport belt.

32. Eliminated adjustment set screws on magazine mounting plate.

- Unnecessary.

33. Eliminated height adjustment bar on intermediate magazine block.

- Unnecessary.

34. Added Gast pump to parallel existing Leiman pump.

- Increase high vacuum for extra reliability.

35. Altered solenoid brackets to conform to Selector design.

- Allows visual inspection of latching during set-up and adjustment.

36. Applied Celvacene to assembly surfaces of manifold block.

- Minimized vacuum leaks; permits ready disassembly.

37. Machined clearing on RH reject magazine.

- Provides clearance on bearing block (necessitated by new rocker shaft).

38. Added selector-type card-positioning clamp (reading station).

- To improve accuracy of card location.

39. The use of 50-magazine blocks for machine insertion of cards was abandoned because required lip aperture location tolerances could not be held consistently. Changes #27, 28, and 60 were a result of this decision and the necessity for Items 12, 13, 15, and 25 was eliminated.

40. The total card counter circuits were changed so that a valid card is recognized if six or more timing marks are read. The previous valid card criterion was three timing marks.

- To improve reliability of card recognition.

SORTER (cont.)

41. A new counter assembly containing Sodeco counters was added. The counter thyratron circuits were also changed to a more reliable design.

42. Relay interlock circuits were added to blank out counters and plunger solenoids when stepping or recycling. This improved the reliability of the card counters.

43. The bit amplifier blower voltage was reduced to improve life of the motor brushes and also the rectifiers in the bridge circuit. The speed was dropped from approximately 10,700 rpm to 7,200 rpm.

44. The values of the RC networks on the stepping switches and relays were changed to reduce transients.

45. Two cathode followers were added and a resistance matrix was changed to a diode matrix in the empty hopper circuit in order to eliminate double stepping of the stepping switches.

46. The polarization detection circuitry was relocated beneath the top plate to make room for the new counter assembly.

47. A pair of connectors was added so that it is now possible to remove the plunger solenoids readily.

48. Faulty connectors were replaced to increase reliability. The same types were used, however.

49. A limited amount of wiring was reworked because loose connections were causing intermittent operation.

50. The plunger solenoid thyratrons and the counter thyratrons were made to reset on the same pulse by modifying some of the circuits to simplify set-up procedure. Previously they reset on separate signals.

51. The plunger solenoid timing was changed (relay circuits) to insure plunger latching for a necessary minimum interval of time.

52. The cam timing was changed to reduce noise on the cell signals.

53. A line filter was added to the A.C. input to reduce the effects of radio noise.

54. A voltmeter was added to monitor low vacuum motor voltage and A.C. input voltage.

55. The diode matrix problem was investigated. It was found that as long as those matrix diodes possess a back resistance of one megohm or greater no problem exists.

SORTER (cont.)

56. Revised main drive motor control circuitry to be independent of line voltage variations. The control motor voltage is now derived from a Sola regulated transformer.

57. Altered power distribution system to provide power for second hi-vacuum pump.

58. Improved programmer package seating by adding clamping bars.

59. Removed block indexing motor and disabled associated circuitry.

60. Made a test box to operate machine during mechanical adjustments.

DUPLICATOR

1. Modified code reader TM shaper circuit.

   - To stabilize phasing of timing mark output pulse.

2. Replaced Globe relays with mercury relays to actuate Flexowriter type-out, and also read station clamp.

   - To eliminate type-out errors due to faulty relay operation and to minimize the possibility of a read station clamp operational error.

3. Removed low vacuum bleeder on output magazine, modified holes in card plunger pad.

   - To eliminate critical vacuum setting and adjustment.

ENLARGER

1. The dynamic range was reduced from 3.5:1 to 2.4:1 in order to differentiate more reliably between document control marks and the edges of punched holes. This change was accomplished by adding a potentiometer in the second stage amplifiers in the image channel.

2. Two rubber star wheels were added to the idler roller of the print stacker to improve the ejection of prints.

PHOTOGRAPHIC AND MISCELLANEOUS

1. Machine Check-out Procedure: Developed and charted a system of machine check-out on daily and weekly basis to reduce time consumed.

   - Check-out provides monitoring of each individual machine performance as well as a compatibility check on overall systems operation.

PHOTOGRAPHIC AND MISCELLANEOUS (cont.)

2. Obtained new photographic step wedges calibrated to ASA visual match diffuse densities.

3. Obtained and checked out use of primary and secondary photographic density standards for densitometry.

4. Established program of latent image tests to provide agreement of facility film processing with reference standards. Refrigerated, exposed samples of Minicard film are submitted simultaneously to the Minicard engineering group in Rochester and to the installation. Processing and densitometry are checked between the two places and a record of results is maintained to insure uniformity.

5. Checked tone transfer capabilities of equipment, and instituted a test card preparation program whereby cards will be sent to Rochester for a photographic check to insure that they do not exceed quality limits set for proper performance.

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ROME AIR DEVELOPMENT CENTER
GRIFFISS AIR FORCE BASE
ROME, NEW YORK

RCSSP/DSF/ijg
11 May 1956

Purchase Request Continuation Sheet

For: Document Data Processing Central AN/GSQ-11

Lab. or Office Symbol: RCDIP

Continuation Sheet No. 1

For P. R. No. _____

Amendment No. 1 to
PRCS dated 27 March
1956

DESCRIPTION OF SUPPLIES OR SERVICES TO BE FURNISHED

Revise the requirements of Item 1 of subject PRCS to include the provisions of Rome Air Development Center Exhibit RADC-2463A dated 7 May 1956, entitled: "Document Data Processing Central AN/GSQ-11."

AIR RESEARCH AND DEVELOPMENT COMMAND
ROME AIR DEVELOPMENT CENTER

Exhibit RADC-2463A
7 May, 1956

DOCUMENT DATA PROCESSING CENTRAL AN/GSQ-11

1. SCOPE

1.1 SCOPE.- This exhibit covers one type of data processing system, designated Document Data Processing Central AN/GSQ-11.

1.2 NOMENCLATURE.- Nomenclature for the individual components covered by this exhibit, where required, will be furnished upon application to the procuring activity.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids, form a part of this exhibit to the extent specified herein.

SPECIFICATIONS

Federal	
NN-B-591	Boxes, Fiberboard, Wood-Cleated (For Domestic Shipment)
NN-B-621	Boxes, Wood, Nailed and Lock-Corner
LLL-B-636	Boxes, Fiber, Solid (For Domestic Shipment)
PPP-B-585	Boxes, Wood, Wire-bound
PPP-B-601	Boxes, Wood, Cleated-Plywood
Military	
JAN-P-100	Packaging and Packing For Overseas Shipment, General Specification
JAN-P-103	Packaging and Packing For Overseas Shipment - Boxes; Wood-Cleated, Solid Fiberboard
JAN-P-106	Boxes; Wood, Nailed (Overseas Type)
JAN-P-108	Boxes, Fiberboard, Corrugated and Solid (Military Type)
MIL-P-116	Preservation, Methods Of
MIL-B-121	Barrier Material, Greaseproofed, Flexible (Waterproofed)
MIL-B-130	Barrier-Materials, Paper, Noncorrosive
MIL-B-138	Boxes, Wood, Fiberboard-Lined For Overseas Shipment (For Weight and Contents Not Exceeding 500 Pounds)
MIL-E-4158	Electronic Equipment, Ground; General Requirements For
MIL-P-4185	Paper, Tissue, Wrapping
MIL-E-5272	Environmental Testing, Aeronautical and Associated Equipment, General Specification For
MIL-E-7729	Enamel, Gloss, For Aircraft Application
MIL-T-9107	Test Reports, Preparation Of
MIL-B-10377	Box, Wood, Cleated, Veneer, Paper Overlaid
MIL-M-13508	Mirrors, Front Surfaced, Aluminum, for Optical Elements

STANDARDS

Military

MIL-STD-129	Marking For Shipment and Storage
MIL-STD-150	Photographic Lenses

(Copies of applicable documents required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 OTHER PUBLICATIONS.- The following documents form a part of this specification. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply:

Consolidated Classification Committee
Consolidated Freight Classification Rules

(Applications for copies should be addressed to the Consolidated Classification Committee, 202 Chicago Union Station, Chicago 6, Illinois.)

3. REQUIREMENTS

3.1 PREPRODUCTION SAMPLE.- This specification requires the submission of preproduction samples for preproduction testing. See Section 4 for details. The first set of components, as described in 3.2, shall be considered the preproduction sample.

3.2 COMPONENTS.- Document Data Processing Central AN/GSQ-11 shall consist of the following components:

Item	Quantity	Description	Requirement
1	4 each	Minicard typewriter tape punch	3.6.1
2	1 set	Minicard cameras	3.6.2
3	1 each	Minicard film processor	3.6.3
4	1 each	Minicard inspection viewer	3.6.4
5	1 each	Minicard film cutter	3.6.5
6	1 each	Minicard file expansion duplicator	3.6.6
7	1 each	Minicard filing sorter	3.6.7
8	1 each	Minicard selector	3.6.8
9	1 set	Minicard enlargers and processors	3.6.9
10	1 set	Minicard analysis viewers	3.6.10
11	1 set	Minicard filing cabinets	3.6.11
12	1 set	Miscellaneous equipment	3.6.12
13	1 each	Air conditioner	3.6.13
14	1 each	Minicard straight duplicator	3.6.14

3.3 GENERAL SPECIFICATION.- The requirements of MIL-E-4158 apply as requirements of this specification. Where the requirements of the general specification and this specification conflict, the requirements of this specification shall govern. Exceptions and additions to the general specification shall be as follows:.

3.3.1 SERVICE CONDITIONS (CLIMATIC)

3.3.1.1 AMBIENT TEMPERATURE:

a.	Operating:	
	(1) All components except air conditioner:	16° to 30°C
	(2) Air conditioner:	4.4° to 50°C
b.	Nonoperating:	-29°C to +54°C

3.3.1.2 RELATIVE HUMIDITY:

a.	Operating:	40 to 60 percent
b.	Nonoperating:	Up to 100 percent including condensation due to temperature changes.

3.3.2 SERVICE CONDITIONS (MECHANICAL)

3.3.2.1 VIBRATION AND SHOCK.- The equipment shall be constructed so as to be capable of withstanding, without loosening of parts and without damage or degradation in the performance specified herein, the shock and vibration conditions encountered during shipping, storage, installation, operation and servicing.

3.3.3 SERVICE CONDITIONS (ELECTRICAL).- The equipment shall be designed to operate from an alternating-current source of power with characteristics within the ranges listed below:

a.	Potential and phase:	230 ±20 volts, a-c, 3-wire, single phase or 115 ±10 volts, a-c 2-wire, single phase
b.	Frequency:	60 ±3 cps

3.3.4 SERVICE LIFE.- The equipment shall be designed and constructed to operate for a minimum of 8 hours per day for a period of three years with only normal maintenance and without major overhaul. The operation period may start after an initial storage period not exceeding two years.

3.3.5 COLOR.- All exterior exposed surfaces of the equipment shall be finished with enamel color No. 516, MIL-C-7729.

3.3.6 MIRRORS.- Front surfaced aluminum mirrors for optical elements shall be in accordance with MIL-M-13508.

3.3.7 PHOTOGRAPHIC LENSES.- The use of photographic lenses shall be governed by the requirements of MIL-STD-150.

3.4 DESIGN.- The document data processing central shall be designed to operate as a system. The central shall be designed to facilitate the handling of masses of the diversified data which must continually be made available in various forms to all echelons of command and using agencies of the United States military establishments for use in their planning and operations. The central shall be a mechanized system, employing micro-reduction photographic techniques in combination with electronic and mechanical devices, which shall be capable of performing the following functions in the handling of data: coding, filing, storing and searching, correlating, retrieving, viewing and reproducing minicards. The central shall also be capable of making enlarged prints from the minicards.

3.5 OVER-ALL REQUIREMENTS

3.5.1 FILM GATE MECHANISM.- The film gate mechanism shall be removable as a unit without the use of tools. If this is not feasible, the film gate mechanism shall be accessible for cleaning by other means acceptable to the procuring activity.

3.5.2 ACCESSIBILITY OF OPTICAL PARTS FOR CLEANING. All exposed surfaces of lenses and mirrors shall be made accessible for cleaning. Lens and mirror mounts, if any of the latter are used, shall be designed so as to insure the accurate return of the lenses and mirrors to their original positions when they are replaced after having been removed for cleaning.

3.5.3 COATINGS.- Appropriate anti-reflective coatings shall be used on the surfaces of all lenses. Aluminum barrels, if used, shall be black anodized.

3.5.4 JAM STOPS.- Jam stops shall be provided in all minicard transport mechanisms in the duplicator, cutter, sorter and selector to prevent damage to the minicards.

3.5.5 PLUGBOARD CONSTRUCTION.- Wherever practicable, plugboard construction of the keyboard type shall be used in the duplicator, sorter and selector. Provision shall be made for a verification procedure to check the accuracy of the selector plugboard wiring.

3.5.6 PLUG-IN UNITS.- To facilitate maintenance, miniaturized replaceable package units shall be used in the electronic portions of the camera, duplicator, sorter and selector.

3.5.7 ALARMS.- Visual or aural fuse alarms shall be provided on all critical units of each equipment to indicate failures or malfunction within these units.

3.5.8 RUNNING TIME INDICATORS.- Running time indicators shall be provided on the camera, film processor, cutter, duplicator, sorter, selector and paper processor.

3.5.9 CODE.- The code used to control the operation of the document data processing central shall be subject to the approval of the procuring activity.

3.5.10 MULTIPLE CARD GROUP.- Multiple card groups shall be held together as groups throughout all sorter, selector and duplicator operations.

3.5.11 SIZE AND WEIGHT.- The document data processing control shall be constructed and designed to be as lightweight as possible, without detracting from the ability of the equipment to meet the service conditions specified herein. Each piece of equipment shall be capable of being moved through a standard 30-inch doorway. No equipment shall be greater than 6 feet in height and 6 feet in length without the approval of the procuring activity. If disassembly and reassembly of any component is required in order to accomplish this, it shall be possible to disassemble and reassemble the component in accordance with simple instructions.

3.5.12 MINIMUM RESOLVING POWER.- The minimum resolving power of the lenses shall be as follows:

Lines per millimeter resolvable by the lens	Position of measurement of test object
400	Center of the lens
300	Outer edge of lens

3.5.13 FILM LIFE.- Newly processed and lubricated 16mm film (mentioned) in good condition and having a shrinkage not greater than 0.3 percent, shall exhibit after 5000 passages through the duplicator, sorter and selector no transport failures due to physical damage to the film. Close inspection of the film itself in the inspection viewer shall reveal no evidence of damage to the film slot.

3.6 COMPONENT REQUIREMENTS

3.6.1 MINICARD TYPEWRITER-TAPE PUNCH.- Each minicard typewriter-tape punch shall provide the means for preparing punched paper tapes of coded information by manual typing on a typewriter keyboard. Each minicard typewriter-tape punch shall also have the capability of typing back the information which has been punched into a paper tape and reading out this information to external equipment.

3.6.1.1 MAKE UP AND OPERATION.- Each minicard typewriter-tape punch shall consist of an electric typewriter with a standard keyboard having the following coupled to it:

a. A tape punch for punching coded information into paper tape. The tape punch shall be capable of being actuated by the normal operation of the typewriter keyboard. The punch shall also be capable of being actuated by the tape reader unit specified below.

b. A tape reader unit for reading the information punched on prepunched punched tape. The tape reader unit shall be capable of reading out the information on the punched tape to external equipment. The tape reader unit shall also be capable of reading the information on a prepunched tape for the purpose of verifying the information punched in a tape. In performing this latter function, the reader unit shall control and actuate the typewriter so as to cause it to

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ptint out the information which is punched in the tape. The tape reader unit shall also control and actuate the tape punch during this operation.

3.6.1.2 TAPE.- Each minicard typewriter-tape punch shall be designed to use standard eight place paper tape.

3.6.1.3 MINICARD TYPEWRITER-TAPE PUNCH FUNCTIONS.- The basic design of the four minicard typewriter-tape punches shall be identical. However, since each of these equipments will be required to perform a different function in the document data processing central, one each of the equipments shall be adapted so that it shall be capable of performing a different one of the following functions:

a. Prepare paper tapes for controlling the code target in the minicard camera.

b. Operate with the camera during exposure of coded information.

c. Operate as a digital print-out of the duplicator.

d. Prepare paper tapes for use in the selector.

3.6.2 MINICARD CAMERAS.- The set of minicard cameras shall consist of the following:

Item	Quantity	Description	Requirement
1	1 each	Minicard camera, document	3.6.2.1
2	1 each	Minicard camera, aerial photograph negative	3.6.2.2
3	1 each	Minicard camera, aerial photograph print and acetate overlay	3.6.2.3

3.6.2.1 MINICARD CAMERA, DOCUMENT.- The document camera shall be capable of recording 12 images of 8-1/2 inch by 14 inch documents plus 10 columns of code on one minicard. It shall be possible to vary the proportion of code and images.

3.6.2.1.1 CODE RECORDING.- Code shall be recorded on the film by exposing the film to a code target which shall correspond to the bit pattern of a single column of code. It shall be possible to record 43 bits plus a timing mark in one column of code. The code target shall be built into the camera and shall consist of a light beam and a series of suitable shutters which can be actuated by means of punched paper tape to form the code pattern of one column of code. Sufficient shutters shall be provided in the code target to permit the recording of 43 bits and the timing mark in a single column. Code shall be recorded by exposing one column at a time beginning with the column nearest the perforations. After one column has been exposed, the film shall be advanced automatically for the exposure of the next column of code. For a minicard containing no images and only code, it shall be possible to record a minimum of 70 columns of code on the minicard. The camera shall be capable of exposing 70 columns of code, each containing 43 bits plus a timing mark, in 15 seconds. It shall be possible to vary the proportion of code and images on the minicard to suit different requirements. One of the 43 bits in each column shall be used in code checking operations in the cameras, duplicator and selector.

3.6.2.1.2 CONTROL OF CODE RECORDING.- The control of the code recording in the minicard camera shall be affected by means of punched paper tape, which has been prepared on the minicard typewriter-tape punch adapted for this purpose, and by means of the minicard typewriter-tape punch adapted to operate with the camera during exposure of coded information. The tape reader of this latter minicard typewriter-tape punch shall read the prepared punched tape into the camera code target and control the code recording. This reader shall also control the typewriter when print-out of the tape content is desired.

3.6.2.1.3 IMAGE RECORDING.- After all code has been recorded, the camera shall be ready for the exposure of the image or images which may be needed for a particular minicard. The recording of images shall be capable of being accomplished manually by the operator by means of suitable control buttons which shall be provided for this purpose. A suitable and properly located easel shall be provided for laying out the images to be recorded. In the case of continuous roll material, manual or automatic means, preferably automatic, shall be provided for the exposure of the material to be photographed. Transport and advance mechanisms shall be provided for handling continuous roll material. After an image has been exposed, the film shall be automatically advanced for the exposure of the next image. The placement of images and code shall be determined by the contractor and subject to the approval of the procuring activity. In addition to recording the images on the film, the camera shall record image control marks which shall provide the means for locating the images on the film. The image exposure lights shall be variable in intensity. Suitable intensity controls shall be provided. In addition, suitable exposure-time controls shall be provided. A suitable indicator shall be provided to indicate to the operator when a minicard has been filled.

3.6.2.1.4 CAMERA OPERATION.- The operation of the camera shall begin when an operator places a punched paper tape in the tape reader and presses a suitable control button which shall be provided to start the operation. When the button is pressed, code recording on the film shall begin and continue automatically until all the code has been recorded. When all the code has been recorded, the tape reader shall stop automatically and a signal shall be provided to tell the operator to proceed with the image exposures. During the code recording, the tape reader shall cause the typewriter to print-out the information from the punched tape if the operator so desires. The operator shall then place the image material to be recorded on the easel or the transport mechanism (for roll material) and exposure of the image on the film shall be made when he presses the proper control button. The actuating of the control button shall also cause the image control marks to be recorded on the film. When the minicard has been filled, an indicator shall indicate this condition to the operator. The camera shall then be set up to begin the next minicard when the operator presses a suitable control button which shall be provided for this purpose. The camera shall automatically come to a stop when only a specified footage required for trailer purposes remains.

3.6.2.2 MINICARD CAMERA, AERIAL PHOTOGRAPH NEGATIVE.- This camera shall be capable of recording a complete 9 inch by 9 inch, a complete 6-1/2 inch by 13 inch or one-half of a 9 inch by 18 inch aerial photograph negative. A back-illuminating unit shall be provided for even illumination

of the negatives being photographed. Means shall be provided for accurate advancing and positioning of the negative material to be photographed. All apparatus required to hold the material in focus shall be provided.

3.6.2.3 MINICARD CAMERA, AERIAL PHOTOGRAPH PRINT AND ACETATE OVERLAY.- This camera shall be capable of recording a 9 inch by 9 inch aerial photograph print, a 10 inch by 13 inch objective print or an acetate overlay measuring up to 22 inches by 25 inches.

3.6.2.4 FILM.- The minicard cameras shall be designed to use 16mm minicard film punched with the standard minicard perforation and wound on 100 and 200-foot daylight loading spools. Loading of the film into the cameras shall be accomplished by a manual threading operation. A manual pulldown shall be incorporated to provide an unexposed length of film to form a leader. After a camera operation has been completed, it shall be possible to advance the film to form a trailer and then cut off the film with a manual shearing device which shall be incorporated on the camera. After exposure this film shall be capable of being processed and cut into individual minicards.

3.6.2.5 REJECTION OF IMPROPERLY MADE MINICARDS.- The minicard camera shall be provided with controls to enable the operator to reject any improperly made minicard. This shall be done by edge notching the films so that the minicard will be rejected in the film cutting operation. Provision shall be made for notching the leader and trailer portions of the film so that they will also be discarded in the film cutting operation.

3.6.2.6 FILM SUPPLY AND EXPOSED FILM INDICATORS.- Suitable indicators shall be incorporated on the camera to indicate continuously the amount of unexposed film on the loading spool. An appropriate indicator shall be provided to show when the last 15 feet of film are left on the supply reel.

3.6.3 MINICARD FILM PROCESSOR.- The minicard film processor shall provide the means for the photographic processing of the 16mm minicard film which has been exposed in the minicard cameras and the minicard duplicators.

3.6.3.1 HANDLING CAPABILITY.- The minicard film processor shall be capable of handling exposed 16mm minicard film on 200-foot daylight loading spools. The processor shall be capable of handling lengths of films as short as one foot, exclusive of leader and trailer. The processor shall be capable of handling film with leader and trailer not longer than 24 inches. The processor shall be capable of processing correctly 200 feet of minicard film with one initial servicing of the developer and fixer baths.

3.6.3.2 LOADING.- It shall be possible to load the film spool into the processor in a normally lighted room. The processor shall be self-threading to minimize manual manipulations. An operator shall be capable of loading a 100 or 200-foot length of film, with a 24-inch leader and trailer, into the processor in 30 seconds or less.

3.6.3.3 PROCESSING CYCLE.- The film processor shall perform the required photographic processing steps to give dry film which can be used immediately in the subsequent operations in the system. The processing cycle shall be adjustable in order to handle minicard film of different sensitometric characteristics. There shall be no evidence of scratching, bending or any other type of damage to the film as a result of the processing cycle.

3.6.3.4 RATE OF OPERATION.- The processor shall operate at the rate of 10 feet of film per minute. The processor shall be ready to operate within 10 minutes from the time the power is turned on, provided it is in standby conditions with all connections made.

3.6.3.5 PROCESSOR TANKS.- The minicard film processor shall be provided with internal tanks designed to continuously replenish the processing solutions with only occasional attention by the operator. An operator shall be capable of making a complete change of the solution in any tank in 3 minutes or less. The processor shall be capable of working with developer and fixer solutions which can be made available in prepared packages.

3.6.3.5.1 INDICATION OF NEED TO REPLACE PROCESSING CHEMICALS. Suitable indicators shall be provided on the film processor to give adequate warning to the operator when processing solutions and chemicals need replacing or replenishing.

3.6.4 MINICARD INSPECTION VIEWER.- The minicard inspection viewer shall be a device designed to provide the means for conveniently viewing minicard images on processed but uncut minicard film. The inspection viewer shall be designed so that it can be used as a separate unit or as an integral part of the minicard film processor. An edge notching device to control rejection of poor quality minicards by the minicard cutter shall be provided as a part of the inspection viewer. There shall be no evidence of scratching, bending, breaking or any other damage to the minicard film as a result of its being passed through the inspection viewer.

3.6.5 MINICARD FILM CUTTER.- The minicard film cutter shall automatically cut individual minicards from a roll of 16mm minicard film which has previously been exposed in a minicard camera or the minicard duplicator and processed in the minicard film processor. The minicard cutter shall also assemble the minicards in a minicard magazine. There shall be no evidence of scratching, bending, breaking or any other damage to the film as a result of the cutting and assembling operations.

3.6.5.1 HANDLING CAPACITY.- The minicard film cutter shall be capable of handling rolls of 16mm processed minicard film, 200 feet or less in length, having standard minicard perforations and wound on a 100 or a 200-foot reel with a leader and trailer 24 inches or less in length. Insertion of film into the cutter in the reverse direction shall result in no cutting operation.

3.6.5.2 FILM REJECTION.- The minicard film cutter shall utilize the edge notching of the film, which was done in the camera, duplicator and inspection viewer, to control and actuate its cutting operation. The minicard film cutter shall cut un-notched film into minicards and reject notched film.

3.6.5.3 CUTTING.- The film cutter shall use the minicard perforation to register the film in the proper cutting position. The location of the cut relative to the perforation shall be dictated by format submitted by the contractor and approved by the procuring activity.

3.6.5.4 COLLECTION OF MINICARDS.- The minicards shall be collected in a magazine on the film cutter in such a way that they can be extracted by a stick without further handling. Minicards removed by the stick from the film cutter shall be ready for use in other equipment without further arrangement. This shall be accomplished for both odd and even generation minicards by providing means for inserting the minicard stick from the base side of odd generation minicards and from the emulsion side of even generation minicards. Where reversal of the film side is required, this shall be done by reversing the side of the film which is fed into the film cutter.

3.6.5.5 OPERATING SPEED.- The film cutter shall be capable of operating at a speed of at least 10 minicards per second.

3.6.6 MINICARD FILE EXPANSION DUPLICATOR.- The minicard file expansion duplicator shall provide the means for making copies of existing minicards on 16mm minicard film. The file expansion duplicator shall be capable of producing identical copies of existing minicards. The file expansion duplicator shall also be capable of producing nonidentical copies by transferring code found in one column of existing minicards to a sorting field column in the duplicates. The file expansion duplicator shall also be capable of performing a code parity check. In addition, the file expansion duplicator shall also have the capability of printing out code from minicards by the use of the minicard typer or tape punch adapted to operate as a digital print-out of the duplicator. Exposed film taken from the duplicator shall be capable of being processed by the minicard film processor and cut by the minicard cutter to form the duplicate minicards.

3.6.6.1 The minicard duplicator shall use 16mm minicard film, perforated with the standard minicard perforation, and wound on 100 or 200-foot daylight-loading spools. Exposed film shall be taken up on a spool, which shall be similar to the supply spool, for transfer to the processing machine.

3.6.6.2 DUPLICATOR OPERATING RATE.- The minicard file expansion duplicator shall operate at a rate of about two cards per second when making identical duplicates and when making duplicates requiring code transfer, at a rate of about 1.5 cards per second.

3.6.6.3 HANDLING OF ORIGINAL MINICARDS.- Original minicards to be duplicated shall be loaded from a minicard stick into an input magazine which shall be provided in the duplicator and which shall have a 2000 card capacity. The cards shall be fed one at a time through the duplicator and collected in another magazine provided in the duplicator from which they can be extracted by means of the minicard stick. Mechanical means shall be provided within the duplicator for inverting individual minicards. Provisions shall be made in the duplicator to eliminate the necessity of having to take the minicards to the selector to invert their order.

3.6.6.4 SENSING FACILITY.- The minicard duplicator shall have a code sensing station preceding the printing location. This sensing station shall have the capability of reading-out the entire code or any designated portion of the code on the minicard. A manual set-up switch which shall change the electrical reading circuit connections shall be provided to accommodate for the photographic black-and-white reversal, and the left to right reversal due to the change of emulsion direction between odd and even generation minicards.

3.6.6.5 COPYING FACILITY.- The printing location shall follow the sensing station in the operational sequence. The minicard shall be printed in contact with the unexposed 16mm film. Vacuum shall be used to insure good contact. The printed image shall be located with respect to the guided edge of the film and the perforation with a tolerance of ±0.002 inch.

3.6.6.6 FACILITY FOR TRANSFERRING CODE.- In addition to straight duplication, the file expansion duplicator shall have the capability of adding code in any column of the sorting field of a duplicate. The code to be added shall be derived from the code field of the minicards being duplicated, and from the input from a perforated tape. Where code is derived from a minicard being duplicated, the code in the open field of this minicard which will require transfer to the sorting field of the duplicates shall be specifically identified by code identification tags. The duplicator shall effect the transfer of code after having sensed and recognized a specified code identification tag. Transfer shall be accomplished by setting up a code target with the code recognized for transfer, and exposing this in the sorting field column. Since the sorting field will be opaque on the original minicard negative, there will be no exposure of the sorting field during the contact printing operation which follows. In the case where multiple minicards are to be duplicated, means shall be provided to store at least 100 machine words of coded data from the open field of a minicard set for transfer to the duplicates which are to be made.

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3.6.6.7 CODE PRINT-OUT FACILITY.- The minicard duplicator shall have the capability of printing out all or any portion of the code on the minicard typewriter-tape punch adapted for use with the duplicator. Print-out shall be in the form of a typewritten recording, a perforated tape recording or a combination of both typewritten and tape recording.

3.6.6.8 Provision shall be made in the duplicator for supplying a leader and trailer of sufficient length for the processing machine. The duplicator shall be able to edge notch the film in the same manner as in the minicard cameras for the purpose of causing the cutter to reject improperly made minicards and discard the leader and trailer portions of film during cutting operations. Unexposed film shall advance only when a minicard to be duplicated is in the printing position. Operation of the duplicater shall automatically stop without disrupting timing circuits and data in electronic storage, when the film supply has reached a specified footage for trailer or leader purposes. The printing operation shall follow the step in which the code is entered into the sorting field. It shall be possible to clear the duplicator of minicards without printing. The minicard duplicator shall not scratch, bend, break or otherwise damage the minicards during handling.

3.6.7 MINICARD FILING SORTER.- The minicard filing sorter shall provide the means for separating a large number of minicards into specified groups which can be fed directly into a unit which can be filed. The minicard filing sorter shall also be capable of fine sorting a group of minicards into a completely ordered sequence.

3.6.7.1 SORTING.- In the sorting operation the input minicards shall be fed one at a time from an input magazine past a sensing station which shall distribute the minicards among a group of ten intermediate magazines

in accordance with one character. The equipment shall be capable of feeding minicards from the intermediate magazine past the sensing station to be distributed in the proper magazine of a 100-section magazine, in accordance with a second character. Each magazine shall be provided with suitable indicators which shall indicate when the magazine is full. When all cards have passed through the machine they shall have been separated into 100 groups. If sorting on a single character only is required, the minicards shall be distributed among the 10 intermediate magazines from which they can be removed directly. If a sort by more than two characters is required, the minicards shall be passed through the machine manually.

3.6.7.2 FILE SORTING.- For the fine sorting operation in the minicard filing sorter, the minicards shall be fed past the sensing station and distributed among the ten intermediate magazines in accordance with the lowest order character. The minicards shall then be fed from these magazines in sequence, past the sensing station and again distributed among ten magazines in the 100-section multiple magazine sorter in accordance with the next character. The sorting shall be continued in this manner, character by character, until completed.

3.6.7.3 INTERMEDIATE MAGAZINES.- The intermediate magazines of the minicard filing sorter shall consist of a group of 10 magazines which can both receive and feed minicards plus a reject magazine. It shall be possible to insert and remove minicards from these magazines with the standard minicard stick. Each magazine shall have a capacity of 2000 minicards.

3.6.7.4 MULTIPLE MAGAZINES.- The multiple magazines of the minicard filing sorter shall be a group of 100 magazines each of which shall have a capacity of 2000 minicards. It shall be possible to insert or remove minicards from these magazines. The multiple magazine shall be mounted on the filing sorter on an indexing mechanism which shall be capable of positioning any selected row of magazines in the multiple magazine over a transport mechanism. It shall also be possible to remove the multiple magazine from the filing sorter so that it can be placed in the minicard file. The 100 magazine section, with each magazine full, shall be capable of being disassembled into units which shall weigh no more than 40 pounds each.

3.6.7.5 LINEAR TRANSPORT MECHANISM.- The minicard filing sorter shall be provided with a linear transport mechanism to carry minicards back and forth between the intermediate and multiple magazines.

3.6.7.6 SENSING STATION.- The sensing station shall be located between the intermediate magazines on the one side, and the input magazine and multiple magazine on the other. It shall be capable of sensing the full coded area of the minicard by a scanning process which shall be synchronized by the timing marks on the minicard. The minicard shall be accurately positioned while in the sensing station so that during the scanning process the center of the light beam of the sensing mechanism shall be able to cover the full coded area of the minicard. The positional accuracy of the minicard while in the sensing station during the scanning period shall be such that no errors shall be introduced during the code reading operation.

3.6.7.7 RATE OF FILING SORTER OPERATION.- The minicard filing sorter shall be capable of being operated continuously at speeds of at least 1200 minicards per minute.

3.6.7.8. WEAR ON THE MINICARD.- The minicard filing sorter shall not scratch, bend or break the minicards during handling. The minicard filing sorter shall be capable of handling a minicard the equivalent of one feeding and one receiving operation at least 1000 times without excessive wear on the minicard. This requirement pertains both to abrasion of the image on the minicard and to wear of the guiding edges of the minicard.

3.6.7.9 ELECTRICAL CONTROLS.- Suitable electrical controls shall be provided for the operation of the minicard filing sorter. A removable plugboard shall be used to set up the operating sequence for the machine. When the machine is operating as a file sorter, it shall be capable of numeric sorting [illegible] per minute and alpha-numeric sorting with two passes per minute. When operating as a block sorter, it shall be possible to combine the characters alphabet into any desired set of groups up to ten. Twelve plugboards with protective coverings to retain permanent plug-in arrangements shall be provided.

3.6.8 MINICARD SELECTOR.- The minicard selector shall provide the means for selecting minicards from a collection of minicards which may be presented to it, in accordance with specified coded and logical data which it shall be possible to set up in the control mechanism of the machine. The minicard selector shall also have the capability of removing duplicate minicards, performing a sequence check operation, a parity check, and performing fine sorting operations. The selector shall also be capable of extraction of master minicards, and checking for the presence of all cards in a multiple card set. The minicard selector shall not scratch, bend, break or otherwise damage the minicards during the selecting and sorting operations.

3.6.8.1 SELECTION.- Minicards shall be fed into the selector from an input magazine. By the selection operation minicards shall be divided into two or more categories and collected into receiving magazines. It shall be possible to remove minicards manually from the receiving magazine by the minicard stick. It shall also be possible to return them to the input magazine by the machine mechanism in order to do further selection.

3.6.8.1.1 The selector shall have a sensing station for scanning the minicards which are fed into the selector. This sensing station shall be capable of reading the full coded area of the minicard. Selection (or question) data shall be set up in the selector and stored internally. In the selection operation this data shall be compared with the sensed data to determine whether a selection is to be made and to which receiving pocket the minicard is to be directed. In addition to selection words, phrase boundaries and the logic of the selection data shall be specified. In general, the selection operation shall include the detection of identities between selection data and sensed data and then testing for the specified logical relationships among the identities.

3.6.8.1.2 The selector shall be capable of handling up to a maximum of 20 words of selection data. A word shall be made up of a maximum of six characters plus an additional character for an identification symbol. Words may either be alphabetic or numeric. Means shall be provided to recognize inequality (equal to, not equal to, greater than, less than) in 20 selection work positions. It shall be possible to handle the logical relation of conjunction (and), disjunction (and/or), and negation (not). Provision shall be made for program [illegible] buffers and "and" gates to permit convenient representation by means of plugboard wiring of the logical relations 'and' and 'not'. It shall be possible to specify phrase boundaries in order to indicate that two or more words of the selection data are to be associated. However provision the plugboard shall be arranged in such a way that all logical relations to be represented on the plugboard shall be capable of being wired directly rather than by indirect procedures. Twelve plugboards with provision [illegible] shall be provided.

3.6.8.1.3 In order to [illegible] minicard system, additional control and [illegible] the timing associated with the transport mechanism. That is, the sensing operation has determined to which receiving pocket a minicard group shall go, it shall be possible to hold the cards of a minicard group temporarily in the primary magazine which shall be the first receiving station. The code for multiplicity designation shall be used to count cards of a group. The minicards for a multiple card document shall be counted, both in the primary station, and if selected they shall be counted out and fed into the proper receiving magazine.

3.6.8.2 REMOVAL OF DUPLICATE MINICARDS.- The selector shall be provided with a means to reject duplicate minicards since this becomes a problem when selection is being made on minicards from several file categories. The selector shall have the capability of comparing successive minicards for document number change. Associated with the use of the multiplicity designation there shall be a means for counting out the cards in a multiple card group.

3.6.8.3 FINE SORTING OPERATION.- The selector shall be capable of doing fine sorting on any specified column in the control or sorting fields. In the sorting operation, minicards in an unknown order shall be fed from the input magazine past the sensing station which shall distribute the minicards among the receiving magazines in accordance with the least significant character of a sorting number. The minicards shall then be returned to the input magazine and a run shall be made on the next character. This process shall be continued for each character. Finally, the minicards shall be accumulated in a single magazine. The selector shall be capable of sorting four-bit numeric codes on one pass per column. In the case of the six-bit code, each character shall be sorted in two steps. Since sorting is to be done on one character at a time and the sensing station is to read all four positions of a word during sorting, provision shall be made to blank out characters not [illegible] in the sorting operation.

3.6.8.4 [illegible] OPERATION.- The minicard selector shall have [illegible] magazine and a receiving pocket magazine in addition to an input magazine. Each magazine shall have a capacity of 2000 minicards. A combination feeding and receiving mechanism shall be associated with each

magazine to extract or insert minicards one at a time as the machine operations require. Visual or aural indicators shall be provided on each magazine to indicate when the magazine is full or empty. It shall be possible to insert or remove minicards manually from all magazines by means of the minicard stick which also has a capacity of 2,500 minicards. The transport mechanism shall carry minicards from the input magazine past the sensing station to the selected receiving magazines. A suitable memory device shall be provided on the transport mechanism. This memory device shall be used to actuate the selected receiving mechanism when the minicard reaches the proper receiving station.

3.6.8.5 CARD HANDLING CAPACITY.- Minicards shall be handled in the minicard selector at a speed of at least 2500 cards per minute. The selector shall be capable of handling a minicard the equivalent of one feeding and one receiving operation at least 5000 times without excessive wear on the minicard. This requirement shall pertain to both abrasion of the images on the minicard and wear of the guiding edges of the minicard.

3.6.8.6 CONTROL REQUIREMENTS.- Selection data words shall be introduced into the machine by punched paper tape. A removable plugboard shall be used to specify the logical relations of the selection data. Provisions shall be made on the plugboard to give complete flexibility to specify planar boundaries as well as to connect output impulses to receiving magazines. A selector switch shall be provided to control the machine return of cards from the receiving magazine to the input magazine. Programming for fine sorting on the selector shall be done partly on the selector plugboard and partly by punched paper tape. Switches shall be provided on each magazine to stop the machine operation when a magazine is full. A means for checking the reliability of the logical circuits of the selector shall be provided.

3.6.9 MINICARD ENLARGERS AND PROCESSORS.- The minicard enlargers and processors shall be designed to reproduce paper prints of minicard images. The minicard enlargers and processors shall be capable of reproducing the same types of material which is handled by the minicard cameras. The set of minicard enlargers and processors shall consist of:

Item	Quantity	Description	Requirement
1	1 each	Minicard enlarger and processor, document	3.6.9.1
2	1 each	Minicard enlarger and processor, aerial photograph and acetate overlay	3.6.9.2

3.6.9.1 MINICARD ENLARGER AND PROCESSOR, DOCUMENT.- This enlarger and processor shall produce paper prints from the documents recorded by minicard cameras, documents (see 3.6.2.1). The minicard images of the 8-1/2 inch by 11 inch documents shall be reproduced to be readable without further magnification.

3.6.9.2 MINICARD ENLARGER AND PROCESSOR, AERIAL PHOTOGRAPH AND ACETATE OVERLAY.- This enlarger and processor shall produce paper prints of all the aerial photographic materials and suitable overlays recorded by the minicard

camera, aerial photograph negative (see 3.6.2.2) and minicard camera, aerial photograph print and acetate overlay (see 3.6.2.3). The acetate overlays, up to 22 inches by 29 inches shall be reproduced to be readable without further magnification. The aerial photographic materials (see 3.6.2.2 and 3.6.2.3) shall be reproduced approximately full size.

3.6.9.3 The minicard enlarger shall have a minicard supply magazine and a minicard receiving magazine, each with a capacity of 400 minicards. Minicards shall be capable of being inserted in the supply magazine and removed from the receiving magazine with the standard minicard stick.

3.6.9.4 ENLARGING.- In the enlarging operation, minicards shall be automatically fed from the supply magazine to the enlarging station. Enlargements shall be made on roll paper [illegible] from the images on the minicards. The enlarging operation shall be automatic and shall be in the order in which the images have been photographed on the minicard. After the images on one minicard have been enlarged, the minicard shall be fed automatically to the receiving magazine and enlargements shall be made from the next minicard. [illegible] controlling the enlarging operation so that either a copy may be made of all images on minicards or only the images desired. The enlarger shall use the notch or other exposure control mark made by the camera specified in 3.6.10 for the latter purpose. There shall be no evidence of scratching, bending, breaking or any other damage to the minicards as a result of the enlarging operation.

3.6.9.5 PROCESSING.- After the enlarging operation, the exposed roll paper shall be processed automatically. Print processing shall give prints which are dry and ready for immediate use. The processor shall be capable of producing prints which shall be uniformly exposed, uniformly processed [illegible] any series of prints, uniformly processed from the first through the last print. There shall be no evidence of scratching, bending, breaking or any other damage to the finished prints as a result of the processing operation.

3.6.9.5.1 The processor shall be provided with internal tanks designed to continue all replenishment [illegible] with operation with only occasional attention of the operator. Suitable automatic visual indicators shall be provided on the processor to give adequate warning when the processing solutions and chemicals need replacing or replenishing. An operator shall be capable of making a complete change of the solution in any tank in 3 minutes or less. The processor shall be capable of working with developer and fixer solution which can be made available in prepared packages.

3.6.9.6 The processors shall be capable of producing processed prints at rates equivalent to 6 feet of photographic paper or more per minute. The handling of minicards in the enlarger and the enlargement exposures shall be made at rates which can be accommodated to the optimum processing cycle. Operation of the minicard enlarger and processor shall be possible under normal room lighting. Variable intensity and variable exposure time controls shall be provided for the enlarger.

3.6.10 MINICARD ANALYSIS VIEWERS.- The minicard analysis viewers shall provide the means for an individual to view the image areas of a minicard. The set of minicard analysis viewers shall consist of the following:

Item	Quantity	Description	Requirement
1	1 each	Minicard analysis viewer, document	3.6.10.1
2	1 each	Minicard analysis viewer, aerial photograph and acetate overlay	3.6.10.2

3.6.10.1 MINICARD ANALYSIS VIEWER, DOCUMENT.- This viewer shall be used for viewing minicards containing the documents recorded by the camera specified in 3.6.2.1

3.6.10.2 MINICARD ANALYSIS VIEWER, AERIAL PHOTOGRAPH AND ACETATE OVERLAY.- This viewer shall be used for viewing minicards containing the aerial photograph material and acetate overlays described in 3.6.2.2 and 3.6.2.3.

3.6.10.3 OPTICAL SYSTEM.- Each analysis viewer shall have an optical system for projecting the image area of a minicard onto a reflection-type viewing screen. The viewing screen shall be part of the viewer. The optical system shall center the image properly and shall give homogeneous focusing of the entire surface of the projected image. Suitable focus controls and change of magnification controls shall be provided on the viewer. There shall be no variation in image focus as a result of extended viewing of any given image.

3.6.10.4 Each analysis viewer shall have a mechanism for accurately shifting from one image position to another on a given minicard. Each analysis viewer shall include an indicator which shall indicate accurately which image location on the minicard is in the viewing position.

3.6.10.5 Each analysis viewer shall have an associated mechanism for notching or otherwise making a control mark on the minicards for the purpose of identifying specific images on the minicard so that the reproduction of only the desired image shall be made in the minicard enlargers and processors.

3.6.11 MINICARD FILING CABINETS.- The document data processing control shall be provided with a lightweight, high-strength, metallic filing cabinet or cabinets containing a minimum of 12 sections of 100 multiple magazine units and 1200 minicard magazine sections. Each magazine unit shall have a 2600 minicard capacity. Means shall be provided for identifying each minicard stick and each chamber into which the sticks are inserted. Each 100 multiple magazine section shall be capable of being withdrawn from and replaced in all section spaces within the cabinet without binding, scraping or striking against other magazine sections and walls or guide rails of the cabinets. The construction of the cabinets shall be such that repeated removal and replacement of the minicards in the individual magazine units shall not damage the minicards. Suitable casters shall be incorporated in the base of the film cabinets to enable them to be moved around.

3.6.12 MISCELLANEOUS EQUIPMENT.- The following items shall be provided as a part of the document data processing central:

a. 50 each standard minicard sticks with locking retainers, each capable of holding 2000 minicards.

b. 200 each disposable minicard sticks, each capable of holding 5 inches of minicards.

c. 2 each minicard transfer trays

3.6.13 AIR CONDITIONING EQUIPMENT.- The air conditioning equipment shall consist of two self-contained units, of the floor-mounted type, each having a nominal capacity of 5 tons (60,000 BTU/hr.) and all accessories required to make the units operate as complete automatic air conditioning systems. Each unit shall have a capacity of at least 60,000 BTU/hr. when return air temperature is 75°F dry bulb and 65°F wet bulb, and condensing temperature is 110°F dry bulb.

3.6.13.1 CABINET.- The cabinet of each unit shall be constructed of heavy gauge sheet metal, with a baked enamel finish. Supply air openings shall be complete with adjustable grilles to provide draft-free circulation when air is discharged from the top section of the unit. The cabinet shall be insulated where necessary to prevent sweating and minimize noise. The cabinet shall contain all component parts required for the operation of the units. These shall include a water cooled condenser, a water regulating valve, a motor-compressor, a magnetic starter, a fan, a fan motor, cooling coils, a drip pan and drain, air filters, controls and all necessary internal electrical wiring.

3.6.13.2 CONDENSING UNIT.- The condensing unit shall be designed for Freon 12 or Freon 22. The condensing unit shall consist of a motor-compressor unit in one complete casing and a water cooled condenser-receiver unit or a water cooled condenser and separate receiver. The motor-compressor shall be mounted on resilient supports.

3.6.13.3 COOLING COILS.- The cooling coils shall be of copper tubing with suitable non-ferrous fins securely bonded to the tubes.

3.6.13.4 FANS AND FAN MOTOR.- The air circulating fan(s) shall be of the centrifugal type, quiet in operation, and balanced statically and dynamically. The quantity of air circulated shall be variable from 2000 to 2500 cubic feet per minute. Where V-belt drive is used, the fan motor shall be provided with an adjustable base or rails for belt tightening.

3.6.13.5 AIR FILTERS.- All materials used in the air filters shall be rust resistant. The air filters shall be capable of being cleaned and shall be of the reusable type.

3.6.13.6 CONTROL PANEL.- The operating controls for each unit shall be grouped together on the front of the unit. The controls shall permit operation of the fan only, or both fan and cooling equipment. The cooling equipment shall be controlled by an adjustable thermostat in the return air stream.

3.6.13.7 ELECTRICAL [illegible] air conditioning units shall be capable of operating from a power source having the characteristics specified in 3.3.4.

3.6.13.8 ELECTRONIC AIR CLEANER.- An electronic air cleaner shall be provided for use with each air conditioner unit. Each air cleaner shall be inclosed in a sheet metal casing. Safety switch assemblies and high voltage signs shall be provided at access doors.

3.6.13.8.1 AIR CLEANER CAPACITY.- Each electronic air cleaner shall have efficiency of 90 percent when cleaning 2500 cubic feet of air per minute.

3.6.14 MINICARD STRAIGHT DUPLICATOR.- The straight duplicator shall provide means for making identical photographic reproductions of existing minicards on a one for one basis. This straight duplication shall be done at a minimum rate of two minicards per second.

4. QUALITY ASSURANCE PROVISIONS

4.1 CLASSIFICATION OF TESTS.- The inspection and testing of the document data processing central shall be classified as follows:

a. Preproduction tests: Preproduction tests are those tests accomplished on a sample representative of the production equipment, to determine that the production equipment meets the requirements of this specification.

b. Acceptance tests: Acceptance tests are those tests accomplished on document data processing centrals submitted for acceptance under contract.

4.2 TEST CONDITIONS

4.2.1 TEMPERATURE AND HUMIDITY.- Unless otherwise specified, tests shall be conducted at an ambient temperature of ±25 ±5°C and a relative humidity between 40 and 60 percent. Where measurements are made under conditions other than specified, they shall be corrected to these conditions.

4.2.2 LINE VOLTAGE.- Unless otherwise specified, the line voltage during all tests shall be 115 ±10 volts or 230 ±20 volts.

4.2.3 LINE FREQUENCY.- Unless otherwise specified in the contract or purchase order, the line frequency during all tests shall be 60 ±3 cycles per second.

4.3 PREPRODUCTION TESTS

4.3.1 PREPRODUCTION TEST SAMPLES.- The contractor shall subject one document data processing central to the preproduction tests specified herein. The preproduction tests shall be performed at the contractor's plant under the supervision of the procuring activity.

4.3.2 PREPRODUCTION TEST REPORT.- After the contractor completes the preproduction tests, he shall furnish the procuring activity three copies of the preproduction test report. The copies of the report shall be in accordance with MIL-T-9107.

4.3.3 The preproduction tests shall consist of the acceptance tests and the following tests:

4.3.3.1 ENVIRONMENTAL TESTS.- The equipment shall be subjected to the following environmental conditions in accordance with MIL-E-5272, with exceptions as specified:

a. High temperature test - Procedure I: Maintain the equipment at a temperature of +54°C for 24 hours, reduce the temperature to +30°C and maintain for 24 hours, while still at +30°C operate the equipment and compare results.

b. Low temperature test - Procedure II: Maintain the equipment at -29°C for a first 4-hour period, raise the temperature to +16°C and maintain for 24 hours, while still at +16°C operate the equipment and compare results.

c. Humidity test - Procedure III: The time of test shall be 100 hours.

d. Altitude test (operating) - Procedure I: Reduce temperature to +16°C. Duration of test shall be 4 hours.

e. Altitude test (nonoperating): Repeat Procedure I at an absolute pressure of 5.54 inches of mercury (pressure at approximately 40,000 feet above sea level) and an ambient temperature of -29°C for 4 hours, but do not operate the equipment. Visually examine the equipment in accordance with the specification.

f. Salt spray test - Procedure I: Corrodible assemblies and parts selected shall be subjected to this test. Duration of test shall be 100 hours.

g. Sand and dust test - Procedure I: Maximum temperature shall be +54°C.

4.3.3.2 SUPPLY LINE VOLTAGE TEST.- The equipment shall be successfully started and stopped 20 times at voltages of 105 and 125 volts or 210 and 250 volts as applicable (see 3.3.4).

4.4 ACCEPTANCE TESTS

4.4.1 INDIVIDUAL TESTS.- Each document data processing central shall be subjected to the following tests. In addition, each equipment shall be subjected to any other test specified herein which the procuring activity considers necessary to determine compliance with the requirements of this specification.

4.4.1.1 MECHANICAL AND VISUAL INSPECTION.- Each equipment shall be subjected to a thorough mechanical and visual inspection and test to determine that the quality of materials and parts, the workmanship and the mechanical construction and operation is in compliance with the requirements of this specification. Particular attention shall be given to the following:

a. Completeness
b. Finishes
c. Ease and smoothness of operation of gears, adjustable and sliding parts, thumb screws, controls, switches and buttons
d. Identification marking, labels and nameplates
e. Machining
f. Rubber to metal surface bonding
g. Welded joints
h. Check of solder joints
i. The fit of components in their respective positions
j. Check of mounting means
k. Check of lubrication and rust prevention
l. Loose fastenings and securing devices of parts
m. Check of safety features
n. Accessibility of components and parts for servicing
o. Ground connections
p. Accessibility of film gate mechanism for cleaning
q. Cable runs, including plugs and receptacles
r. Accessibility of optical parts for cleaning
s. Accuracy of replacement of lens and mirror mounts after their removal for cleaning
t. Operation of all jam stop mechanisms
u. Operation of alarms
v. Operation of all transport mechanisms
w. Operation of running time indicators
x. Over-all dimensions check
y. Operation of the typewriter-tape punch
z. Ease of loading the camera and the film processor
aa. Operation of the inspection viewer
bb. Ease of replacing processing solutions in the processors
cc. Ease of removal and replacement of minicards in the filing cabinets
dd. Other visual defects

4.4.1.2 ELECTRICAL TESTS.- Each equipment shall be given thorough electrical tests to determine that all circuits are inherently sound so that over-all performance of the equipment in compliance with the requirements of this specification shall be obtained. The electrical tests shall include but not necessarily be restricted to the following:

4.4.1.2.1 OPERATING VOLTAGES.- The operating voltage at all important points shall be checked for conformance with those shown on the circuit labels and schematic drawing. This shall be done with all controls set for normal operation of the equipment.

4.4.1.2.2 RELIABILITY OF CONTROL BUTTONS, SWITCHES AND INDICATORS.- Each control button, switch and indicator shall be tested to determine that it performs its assigned operation or function.

4.4.1.2.3 The selector, sorter and duplicator shall be tested to insure that they follow keyboard or plugboard instructions accurately.

4.4.1.3 PERFORMANCE TESTS.- Each equipment shall be given thorough performance tests to determine compliance with the requirements of this specification. The contractor shall prepare a test program, sufficiently comprehensive to completely test the performance of the equipment, and shall submit a description of this program to the procuring activity for approval at least 60 days prior to the start of any testing. The program shall include but not necessarily be restricted to the following tests. The following test procedures are to be used as a guide by the contractor in preparing his test program:

4.4.1.3.1 CAMERA TESTS.- The minicard cameras shall be subjected to the following tests:

4.4.1.3.1.1 LENS RESOLVING POWER TEST

a. Photograph a standard optical resolving chart by all the image lenses used in the universal camera at all the magnifications at which they will be employed for the various minicard formats.

b. A standard resolving pattern should be displayed in all four corners and at the center of the image field.

c. Process the film exposed in the minicard camera in the preceding operation in the minicard film processor.

d. Examine the processed film under a microscope.

e. The test patterns shall be reproduced in such a manner that three hundred lines/mm will be discernable at the four corners of the image and four hundred lines/mm at the center.

4.4.1.3.1.2 SPEED OF CODE EXPOSURE TEST

a. Feed coded data into the code exposing mechanisms within the minicard camera.

b. Check the speed at which the camera can perform code exposure by any accepted standard.

c. The camera shall be capable of exposing 70 columns of code, each containing 49 bits plus a timing channel, in 18 seconds.

d. Print out of this coded data on the processed minicard by the minicard duplicator.

e. There shall be no errors when the printed out coded data is checked against the data which was fed into the minicard camera.

f. Repeat the above test ten times.

4.4.1.3.1.3 CODE EXPOSURE ACCURACY TEST

a. Prepare and check perforated tapes suitable for exposing 70 columns of coded data onto 50 minicards. The coded data to be placed on each minicard shall be selected at random and the combinations of alpha numeric characters for each minicard shall be different.

b. Expose the coded data onto minicard film and process, check and cut the film into minicards.

c. Feed the individual minicards into the minicard duplicator and print out the coded data.

d. The print out data shall be identical with the data found in the original tapes used to prepare the minicards.

4.4.1.3.1.4 CUTTER-NOTCHING CONTROL TEST

a. Prepare a 20-foot length of film in the minicard camera that includes rejection notches and notches which indicate the first and last exposed minicards.

b. Record the exact order of the notches and the number of minicards between each set of notches.

c. Place the strip of film in the minicard cutter and run it through.

d. Check the rejected film and accepted minicards against the record in b. above.

e. The camera shall have placed the notches on the film correctly and the notches shall have controlled the cutter properly.

f. Similar tests shall be executed for the notching devices which form part of the duplicator and inspection viewer.

4.4.1.3.1.5 IMAGE REGISTRATION AND ACCURACY OF IMAGE PLACEMENT TEST.-

a. Prepare several minicards by exposing code and document images on minicard film.

b. Process the film and cut it into individual minicards.

c. Measure the image placement on the minicards. Measurement of image placement shall find each image equidistant from the adjacent images with an allowable error as determined by the requirements specified in 3.6.2.1.3

4.4.1.3.1.6 TEST FOR EXPOSURE LIGHT INTENSITY AND EXPOSURE TIME CONTROLS.

a. Set the intensity of the image exposing lights at their average settings.

b. Manipulate the intensity controls in both directions.

c. The intensity controls on these lights shall provide an intensity variation in either direction by a factor of two.

d. Check the exposure time controls to see that they provide the range necessary to accommodate the types of materials designated in 3.6.2.1, 3.6.2.2 and 3.6.2.3

4.4.1.3.1.7 FILM SUPPLY AND EXPOSED FILM INDICATORS TEST.-

a. Place lengths of film, of from 20 to 200 feet in increments of 20 feet, on both the film supply and exposed film reels.

b. Observe the readings on film supply and exposed film indicators.

c. The observed readings as compared against prepared lengths of film should not vary by more than 3 feet.

d. The mechanism for automatically stopping the camera when only a specified footage, required for trailer purposes, remain, shall be tested for proper functioning.

4.4.1.3.1.8 TEST FOR CODE OR IMAGE STOP ON FULL MINICARD

a. Prepare a perforated tape containing over 490 characters of code.

b. Feed this tape into the minicard camera.

c. The minicard camera shall come to a stop automatically when 490 characters have been exposed on the minicard film.

d. Press the code expose and document expose buttons.

e. The camera should not respond.

f. Advance the film mechanism for a new minicard and expose ten columns of code.

g. Expose twelve document images on the same minicard.

h. The camera should indicate that the minicard is full and pressing of the code expose and document expose buttons should produce no further action by the camera.

to the perforation and the minicards shall show no evidence of undue stresses, scratches or breaks.

4.4.1.3.2.4 TEST FOR ABILITY TO REMOVE MINICARDS FROM CUTTER MAGAZINE.

a. Place 2000 minicards in the receiving magazine.

b. Insert a minicard stick in the receiving magazine.

c. The 2000 minicards shall be capable of being removed from the magazine by the minicard stick without binding or injury to the minicards.

4.4.1.3.3 MINICARD FILM PROCESSOR TESTS.- The minicard film processor shall be subjected to the following tests:

4.4.1.3.3.1 QUALITY OF PROCESS TEST

a. Expose 20, 30, and 200-foot lengths of film in the minicard camera so that they contain coded bits and a resolution test pattern in at least every 100 feet of their entire lengths.

b. Process these lengths of film in the minicard film processor and check the film for variations in density of exposed areas and variations in readability of the test patterns.

c. There shall be no visible difference in density of exposed areas and no difference in readability when examined by the naked eye and in the desk viewer.

d. Examine the film. There shall show no evidence of scratching, breaking or any other type of damage caused by the processor.

4.4.1.3.3.2 WARM UP PERIOD TEST

a. Place a 100-foot length of film having test patterns exposed on it and containing 24 inches of leader and trailer in the film processor.

b. Check the time it takes to load the film into the processor.

c. A trained operator shall be able to insert the length of film for processing in 30 seconds or less. The processor shall not require leader or trailer longer than 24 inches.

d. Turn on the solution heaters.

e. Start the processing cycle exactly ten minutes after turning on the solution heaters.

f. Check the processed and dried film for variations in density of the exposed areas and for differences in readability of the test patterns. All checks shall be made with the naked eye and magnified on the desk viewer. There shall be no visible differences in density of exposed areas and no difference in readability.

4.4.1.3.3.3 TESTS FOR PROCESSOR SOLUTIONS AND CONTROLS

a. Add a fresh batch of developer and fixer solution to the processor from the prepared packages.

b. Process 200 feet of minicard film without changing solutions.

c. The processor shall be capable of processing correctly and without visible variation in extent of development, the 200 feet of minicard film.

4.4.1.3.4 MINICARD ENLARGER AND PROCESSOR TESTS.- The minicard enlarger and processor shall be subjected to the following tests:

4.4.1.3.4.1 QUALITY OF THE REPRODUCTION TEST

a. Select and place 60 good quality minicards containing 12 images per minicard into the feed magazine of the enlarger and processor.

b. Activate the equipment at a minimum rate of 6 prints per minute and allow it to operate until the images on all 60 minicards have been enlarged and 720 prints have been made.

c. This operation shall not require longer than 2 hours.

d. Check the finished prints.

e. The finished prints shall be free from scratches, bends, tears, completely dry, uniformly exposed, uniformly processed within each frame and uniformly processed in comparing the first frame processed against the last.

f. Check the minicards after the enlarging operation. The minicards shall not be damaged or deteriorated due to the enlarging operation.

g. The same type of tests for exposure light intensity and exposure time controls as are specified for the camera in 4.4.1.3.1.6 shall be carried out for the enlarger.

4.4.1.3.4.2 TEST FOR SELECTION OF IMAGES TO BE REPRODUCED IN ENLARGER.

a. Place a group of 20 minicards in the receiving magazine. These minicards shall have designations on them for controlling exposure of specific images within the image areas.

b. Make a record of those images on each minicard which have been marked for the enlarging operation.

c. Pass the 20 minicards through the enlarger and collect the finished prints produced by the processor.

d. Compare the record made in b. above with the finished prints. The images enlarged should be identical with the recorded list of images.

4.4.1.3.5 MINICARD DESK VIEWER TESTS.- Each minicard desk viewer shall be subjected to the following tests:

4.4.1.3.5.1 TEST OF TRANSPORT UNIT

a. Energize the transport unit.

b. Insert a [illegible] minicards in the supply magazine.

c. Use transport mechanism to move all the minicards from the supply magazine to the receiving magazine.

d. The above operation shall occur with no dropping of the minicards while in the supply magazine and all of the minicards in any of the positions viewed and no noticeable variation in handling ability as less cards remain in the supply magazine.

e. Return the minicards to the supply magazine using the transport mechanism. There shall be no binding or dropping of minicards in this reverse operation.

4.4.1.3.5.2 TEST OF IMAGE CHANGE KNOB AND IMAGE INDICATOR

a. Place a minicard prepared with the document format and containing twelve images in the viewing position.

b. Move the minicard through all twelve document image positions using the appropriate transport controls.

c. The document images shall be properly centered in each of the twelve image locations and, for all twelve images, the image indicator shall indicate accurately which image location is in the viewing position.

4.4.1.3.5.3 TEST OF NOTCHING MECHANISM

a. Place 50 minicards, prepared according to the document format, in the supply magazine. The minicards shall have a varying number of images and the minicards with different image numbers should be distributed randomly throughout the group.

b. Advance the minicards one at a time to the viewing position and then to the edge notching position.

c. Notch various images for reproduction making sure that throughout the group of 50 minicards, each image position is notched at least four times. Record the notches associated with each minicard.

d. Place the minicard group in the minicard enlarger and processor and set the controls for automatic processing by edge notch control.

e. Pass the group of minicards through the minicard enlarger and processor and collect the processed prints.

f. Compare the record reels in e. above with the processed prints. The number and identity of images enlarged and processed shall be identical with the recorded list of the image notches in the edge notcher in the desk viewer.

4.4.1.3.5.4 TEST FOR MINICARD HANDLING AND OPERATION OF FOCUS AND MAGNIFICATION CONTROLS

a. Place one minicard of each type of format capable of being processed in the minicard camera in the proper analysis viewer.

b. Pass each minicard through the viewer from the supply magazine to the viewing reading station and to either the "accept" or "reject" magazine and test one hundred times. In the case of the minicard with the document format, index it through each image location on every pass through the reading station.

c. Inspect these minicards in the analysis viewer. There shall be no evidence of damage to the image or coded areas due to the above test. The focus controls and change of magnification controls shall operate with ease and without the necessity for viewer disassembly.

4.4.1.3.5.5 OPTICAL TESTS FOR DESK VIEWER

a. Place and view 5th generation minicards, prepared according to the 8-1/2 by 14 inch document, and 22 by 28 inch acetate overlay record formats, in the analysis viewer. The images displayed in the various formats shall contain a great deal of whatever type of graphical or textual information represents the most stringent viewing requirements for each format or material recorded in each format. The minicards used shall be made and processed in the universal minicard camera, minicard film processor and minicard duplicator.

b. For each of the above minicards, the material presented on the viewing screen shall be readily readable in all areas of the projected image. There shall be no variation in image focus as a result of extended viewing of any given image.

4.4.1.3.6 MINICARD FILING SORTER TESTS.- The minicard filing sorter shall be subjected to the following tests:

4.4.1.3.6.1 MINICARD LIFE TEST

a. Make up 50 minicards with identical sorting codes and place these minicards on a stick with blank minicards to fill up the stick to its 2000 minicard capacity. A stop shall be fixed between the two groups of minicards to prevent the blanks from passing through the machine. The stop may be a plastic piece the size of a minicard with a greater thickness.

b. Make the proper plugboard and any other special connections necessary to get the minicards sorted back and forth between supply magazines and receiving magazines automatically.

c. Pass the 50 minicards back and forth between the intermediate and multiple magazines approximately 5000 times at a speed setting of 1200 minicards per minute.

d. Make the following checks during the operation in c. above:

(1) During each operation check the magazine indicator for a full reading. When a magazine is full, the indicator shall so indicate.

(2) Check for minicard jamming, dropping, or the feeding of minicards into the wrong magazine. Such malfunctions shall be held to an absolute minimum.

(3) At intervals throughout the test, check the equipment for maintenance of the 1200 minicard per minute speed. The 1200 minicard per minute speed shall be maintained throughout the test.

e. After the 5000 operations, check the minicards for abrasion, edge wear and bends. The 50 minicards shall still be capable of effective sorting after the 5000 passes.

4.4.1.3.6.2 TEST FOR POSITIONAL ACCURACY OF MINICARD WHILE IN SENSING STATION

a. By an acceptable method, measure the positional accuracy of a minicard in the sensing station.

b. The positional accuracy of the minicard while in the sensing station during the scanning period shall be within the tolerances specified in 3.5.7.6.herein.

4.4.1.3.6.3 TEST FOR THE INTERMEDIATE MAGAZINES

a. Make up 1000 minicards with 10 different sorting codes. Twenty minicards should purposely be made incorrect to test the reject magazine.

b. Insert the minicards into the input magazines.

c. Set up the plugboard and place it into position.

d. Energize the sorter and sort and reassemble this group three times.

e. The minicards shall go to the proper magazines during each sort. The sorter shall stop when the last minicard leaves the input magazines. The 20 incorrect minicards shall be rejected during each sort.

4.4.1.3.6.4 TEST FOR THE MULTIPLE MAGAZINE

a. Fill the input magazines with three stacks full of minicards whose sortation columns contain information which can be distributed [illegible] different file sections.

b. Operate the sorter [illegible] check the following:

(1) With the selector switch set to number one magazine, ascertain that it is emptied before starting on any other magazine.

(2) Check automatic change to the next magazine.

c. Pass the minicards from the intermediate magazines to the multiple magazines.

d. Check that the 100 block section is indexed to each successive position automatically.

4.4.1.3.7 MINICARD SELECTOR TESTS.- The minicard selector shall be subjected to the following tests:

4.4.1.3.7.1 SELECTOR LOGIC TESTS

a. The selector shall be tested to determine that it will accurately follow logical instructions represented by wiring connections on the plugboard. These instructions shall include:

(1) The logical relations "and", "or", "and/or", "not", "greater than", "equal to", "less than", both individually and in combinations.

(2) Phrase boundaries.

b. The selector shall be tested to determine that it will accurately follow such instructions for up to and including 20 symbols inserted into the storage registers of the selector.

c. The selector shall be tested to determine that it is capable of following accurately both general and specific instructions wired on a single plugboard in relation to the same set of symbols inserted into the storage registers. The resulting selector action shall assign cards to different receiving hoppers on the basis of the specificity of the relations among the input symbols which the cards fulfill.

d. The selector shall be tested to determine that it is capable of rejecting all minicards whose coded data do not satisfy the requirements set up on the plugboard and inserted into the storage registers.

e. The verification procedure for checking on the accuracy of plugboard wiring by an operator shall be tested for proper functioning.

f. The mechanism for checking the reliability of the logical circuits of the selector shall be tested for proper functioning.

4.4.1.3.7.2 TEST FOR THE MULTIPLE MINICARD GROUP SORTING

a. Make up a group of 99 minicards which will operate as one document.

b. Place them in the input magazine preceded and followed by approximately 200 other minicards.

c. Set up the plugboard and insert it into the sorter.

d. Start the machine operation and watch the input indicators on the hold magazine.

e. When the control group of 99 minicards is sorted the full group should pass into the hold magazine and thence to the designated receiving magazine without error.

4.4.1.3.8 MINICARD DUPLICATOR TESTS.- The minicard duplicator shall be subjected to the following tests:

4.4.1.3.8.1 CODE TARGET TEST

a. Energize the shutters on the code target to check their operation.

b. Place unexposed film on the duplicator and expose the first and second code columns on 10 minicards.

c. Check the processed film. The coded data of the processed minicards shall show clear and distinct bit patterns which are an exact reproduction of the data which was fed to the code target.

4.4.1.3.8.2 PRINT QUALITY CHECK

a. Place a master minicard prepared according to the document format in the contact print position of the duplicator. All twelve image locations shall contain images of a standard optical resolving chart. The center and all four corners of each image shall contain patterns with resolving capability of at least 250 lines/mm.

b. Make 20 contact prints of the test minicard.

c. Process the film containing the 20 uncut minicards in the minicard film processor and cut them in the minicard cutter.

d. Examine the images on the newly prepared minicards. The quality of reproduction shall be such that the 250 line per mm resolving patterns can be read at the center and four corners of each image on all 20 minicards.

4.4.1.3.8.3 CODE PRINT-OUT TEST

a. Prepare 10 minicards, each containing 70 columns of coded data.

b. Print out the coded data in the typewriter-type punch during the exposure of the 10 minicards. Hold the printed-out data for future use.

c. Place the 10 minicards in the code print-out location of the duplicator.

d. Perform the operations necessary to print-out the following:

(1) All the data on the first three minicards.

(2) The first ten columns only of the fourth minicard. On the remaining six minicards instruct the duplicator to search out and print-out data according to six different word tags.

e. Check the data printed-out during d. above with the printed-out data obtained in b. above. The two sets of data shall be identical.

4.4.1.3.8.4 CODE TRANSFER DUPLICATION TEST

a. Prepare a set of six control minicards which will operate as one document group. The first four minicards in the set shall contain a total of 70 columns of different code data suitable for use in the transfer operation in making a cross referenced working file. The last two minicards shall contain data in the fixed field and image information.

b. Place these minicards in the receiving magazine of the duplicator.

c. Program the necessary operations and begin machine operation.

d. Make four complete cross referenced files of 720 minicards each in one pass through the duplicator.

e. Process and cut the minicard film produced at the end of this operation.

f. Count the minicards produced and check in the print-out portion of the duplicator. The proper number of minicards shall have been prepared in each set and the minicards shall have the correct correlation codes on them.

4.4.1.3.9 MINICARD FILING CABINET TESTS.- Each minicard filing cabinet shall be subjected to the following tests:

4.4.1.3.9.1 MECHANICAL DESIGN TESTS

a. Fill a 100 chamber multiple section drawer so that each chamber contains 2000 minicards.

b. Place and withdraw the section in all of the section spaces within the cabinet. This shall be accomplished without binding, scraping or sticking of the section against the walls or guide rails.

c. Remove 1800 minicards from one chamber, 1200 minicards from another, and 200 minicards from a third in this multiple unit.

d. Replace the minicard weights.

e. The weights should slide down easily, without binding and without having to be pushed within the chambers until they exert pressure on the top minicard.

f. Insert minicard sticks into these three test chambers plus a full chamber. The sticks shall pass through the weight and minicards smoothly without binding and without damage to the minicards.

g. Place retainers on the ends of ten minicard sticks, each containing 2000 minicards.

h. Remove from the section chambers and holding the retainer end down shake each stick vigorously. The retainers shall not fall off and the stick shall not be damaged.

i. Select one dozen retainers at random and insert and remove them from 12 sticks of minicards 50 times. There shall be no binding or slipping during the operation.

4.4.1.3.10 AIR CONDITIONING EQUIPMENT TESTS.- The air conditioning equipment shall be subjected to the following tests:

4.4.1.3.10.1 Each air conditioning unit shall be placed in a test chamber at room temperature. The capacity shall be measured with 2500 cfm of air at the discharge outlet, and condensing temperature at 110°F.

4.4.1.3.10.2 Adjust the chamber temperature to provide air into the unit at 75°F dry bulb and 65°F wet bulb. With condensing temperature at 110°F, and 2500 cfm of air at discharge outlet, measure the capacity of the unit. Record data at intervals of 15 minutes for two hours. Capacity based on recorded data shall be at least 60,000 BTU/hr.

5. PREPARATION FOR DELIVERY

5.1 GENERAL.- The packaging, packing, and marking requirements specified herein apply only to direct purchases by, or direct shipments to the Government.

5.2 PRESERVATION AND PACKING

5.2.1 LEVEL A.- The equipment shall be preserved and packaged in accordance with MIL-P-116, Method IIB.

5.2.2 LEVEL B.- The equipment shall be preserved and packaged in accordance with the manufacturer's commercial practice. Packaging material in direct contact with unprotected surfaces susceptible to damage by corrosion shall meet MIL-B-121, MIL-P-4185 or MIL-B-130.

5.2.3 LEVEL C.- The equipment shall be preserved and packaged in accordance with the manufacturer's commercial practice.

5.3 PACKING

5.3.1 LEVEL A.- Equipment preserved and packed to meet 5.2.1 and 5.2.2 shall be packed in export type shipping containers meeting JAN-P-103, PPP-B-585, JAN-P-108, JAN-P-106, MIL-B-138 or PPP-B-601.

5.3.2 LEVEL B.- Equipment preserved and packaged to meet 5.2.2 and 5.2.3 shall be packed in domestic type exterior containers meeting NN-B-591, PPP-B-601, NN-B-621, LLL-B-636 or MIL-B-10377.

5.3.3 LEVEL C.- The equipment packages which require overpacking for acceptance by the carrier shall be packed in commercial exterior shipping containers in a manner that will insure safe transportation at the lowest rate to the point of delivery. Containers shall meet Consolidated Freight Classification Rules or regulations of other common carriers as applicable to the mode of transportation.

5.4 PHYSICAL PROTECTION.- Cushioning, blocking, bracing and bolting as required shall be in accordance with JAN-P-100 except that for domestic shipments, waterproofing requirements for cushioning materials and containers shall be waived. Drop tests of JAN-P-100 shall be waived when preservation, packaging and packing is for immediate use or when the drop tests of MIL-P-116 are applicable.

5.5 MARKING.- Interior and exterior containers shall be marked in accordance with MIL-STD-129. The nomenclature shall be as follows: Document Data Processing Central AN/GSQ-11( ).

6. NOTES

6.1 INTENDED USE.- Document Data Processing Central AN/GSQ-11 is a mechanized system, employing microreduction photographic techniques in combination with electronic and mechanical devices, intended to be used to facilitate the handling of masses of the various forms of diversified data used by the United States military establishments in their planning and operations. The system will perform the following functions in the handling of data: indexing, coding, filing, sorting, storing and searching, correlating, retrieving, viewing and reproducing.

6.2 ORDERING DATA.- Procurement documents should specify the following:

a. Title, number, and date of this specification.
b. Level of preservation, packaging and packing required. (See 5.2 and 5.3)
c. Conditions under which design approval will be granted.

6.3 DRAWINGS.- Upon the specific request of the contractor to the procuring activity, a copy of the applicable drawings of the equipment, if available, may be furnished for informational purposes only.

6.4 No production Document Data Processing Central AN/GSQ-11 should be fabricated or accepted prior to the approval of the preproduction sample. Production should not start until all component parts have been approved by the procuring activity.

Patent notice: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

SECRET

DPD-7683-59
13 November 1959

MEMORANDUM FOR: Comptroller, DPD

SUBJECT : Patent Rights and Royalties Reports
Contract No. EQ-1806
Eastman Kodak Company

1. Attached are negative reports concerning Patent Rights and Royalties under Contract No. EQ-1806 with Eastman Kodak Company.

2. These reports are concurred in.

25X1A

[redacted]
Contracting Officer, DPD

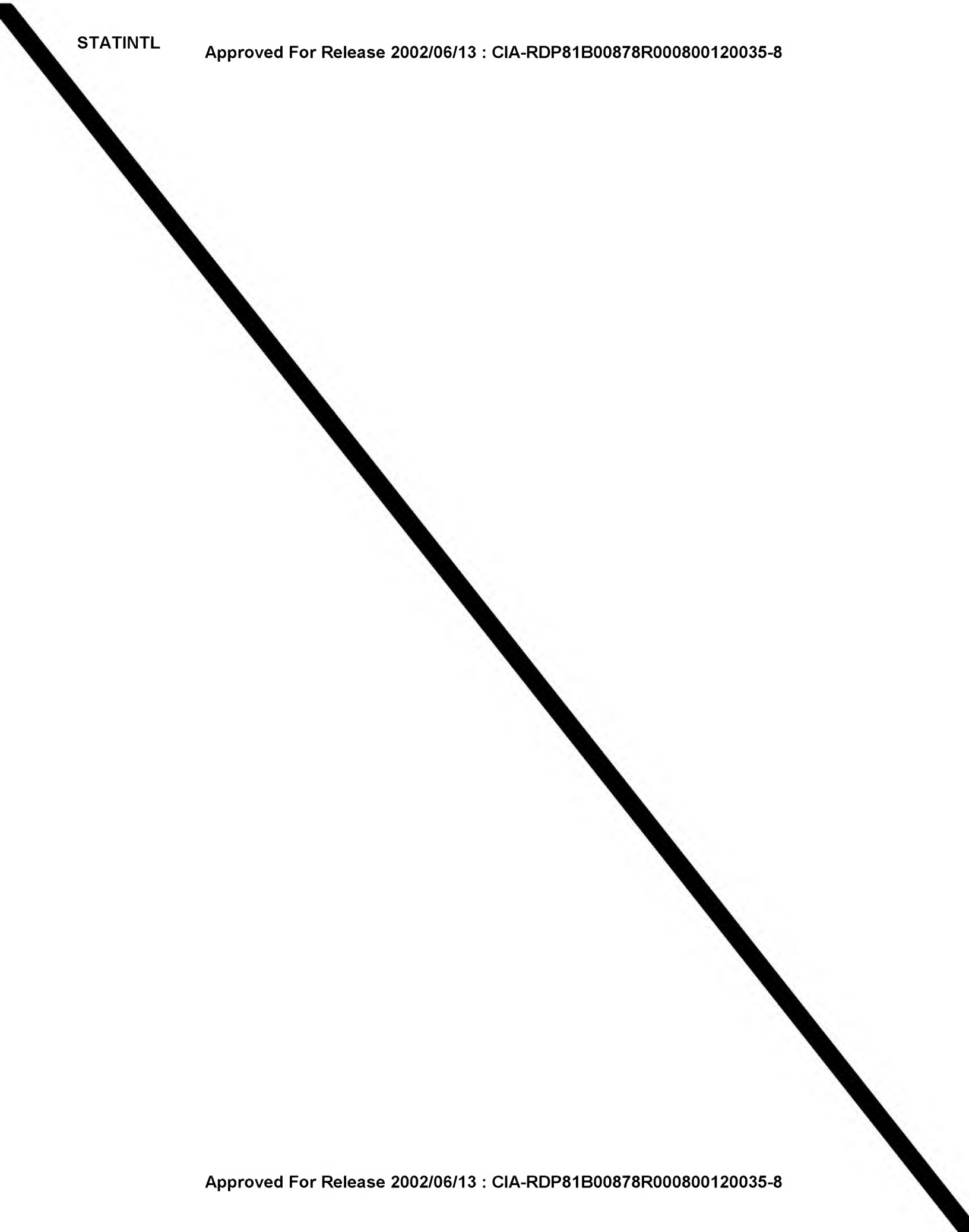
Enclosures:
Copy 1 DPD-7757-59
Copy 1 DPD-7758-59

Distribution:
Orig - Finance w/encls
cc - Contracts (EQ-1806 T&P w/
cy 2 DPD-7757 & 7758 - 59)
cc - Chrono, RI

DPD-DD/P [redacted] (13-11-59)

25X1A

SECRET



Approved For Release 2002/06/13 : CIA-RDP81B00878R000800120035-8

RPD-7758-59
Copy 2 of 2

November 9, 1959

Dear Sir:

Subject: Contract [redacted], 2-1170
Final Royalties Report

No royalties have been or are to be paid to others in connection with the work done under this contract, either by us or by our subcontractors.

J. L. B.

cc: FGF
ELG
file